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Lockheed Martin Space Systems Company

# SCITECH 2016

# Welcome

Welcome to the AIAA Science and Technology Forum and Exposition 2016 (AIAA SciTech 2016) – the world's largest event for aerospace research, development, and technology. We are confident that you will come away from San Diego inspired and with the tools necessary to continue shaping the future of aerospace in new and exciting ways.

From hearing preeminent industry thought leaders, to attending sessions where cutting-edge research will be unveiled, to interacting with peers – this will be a most fulfilling week! Our organizing committee has worked hard over the past year to ensure that our plenary sessions examine the most critical issues facing aerospace today, such as aerospace science and technology policy, lessons learned from a half century of aerospace innovation, resilient design, and unmanned aerial systems. We will also focus on how AIAA and other stakeholders in academia, government, and industry can work together to best serve the aerospace community.

The Forum 360 program offers you the chance to dive deeper into the topics discussed in the plenary sessions and consider them from multiple angles. Topics to be covered include: how scientists and engineers can communicate better with the public about their work and achievements; how the International Space Station can be used to further research and development; how lessons from other industries can improve cybersecurity in aviation; how additive manufacturing can be used for aerospace applications; what educators can do to put the "E" in STEM; and what design and imagination lessons can be captured from Hollywood for use in aerospace.

The forum's technical program provides opportunities to hear the presentation of groundbreaking research across the aerospace science and technology fields. These presentations will not only show you how your peers are overcoming the challenges that are posed by the advancement of aerospace science and technology, but will stimulate your own creativity, inspiring you to tackle new challenges and further progress the state of the art in our community.

While you are with us this week, be sure to spend some time in the Exposition Hall. More than 50 companies and organizations are showcasing their innovative products and services and with the wide variety of technology on display, you are sure to see something new.

AIAA SciTech 2016 offers something for every aerospace professional, regardless of the role you play in our community. We are excited to offer you this program, and we can't wait to see how you will take the information presented and lessons learned and use it to shape the future of aerospace and your career!

## AIAA SciTech 2016 is proud to feature the following conferences:

- AIAA/AHS Adaptive Structures Conference
- AIAA Aerospace Sciences Meeting
- AIAA Atmospheric Flight Mechanics Conference
- AIAA Information Systems — Infotech@ Aerospace Conference
- AIAA Guidance, Navigation, and Control Conference
- AIAA Modeling and Simulation Technologies Conference
- AIAA Non-Deterministic Approaches Conference
- AIAA Spacecraft Structures Conference
- AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference
- Dynamics Specialists Conference
- Symposium on Space Resource Utilization
- Wind Energy Symposium

# Organizing Committee

**SciTech 2016 Forum General Chair**
**Mason Peck,** Cornell University

**Forum 360 Chair**
**Ann Zulkosky,** Lockheed Martin Space Systems Company

**Young Professional Chairs**
**Benjamin Marchionna,** Lockheed Martin Corporation

**Sam Alberts,** Purdue University

**Forum Technical Chairs**
**Brad Burchett,** Rose-Hulman Institute of Technology

**Misty Davies,** NASA Ames Research Center

**Jeanette Domber,** Ball Aerospace & Technologies Corp.

**Forum Deputy Technical Chairs**
**Terry Morris,** NASA Langley Research Center

**Richard Ruff,** MathWorks

**Ben Thacker,** Southwest Research Institute

**Michael White,** Ohio Aerospace Institute

**Technical Discipline Chairs**

**Adaptive Structures**
**Farhan Gandhi,** Rensselaer Polytechnic Institute

**Aeroacoustics**
**Jeffrey Peters,** Rolls-Royce Corporation

**Aerodynamic Measurement Technology**
**Philippe (Phil) Lavoie,** University of Toronto

**Air Breathing Propulsion Systems Integration**
**Larry Leavitt,** NASA Langley Research Center

**Aircraft Design**
**Gil Crouse,** Sierra Nevada Corporation

**Applied Aerodynamics**
**Khaled S. Abdol-Hamid,** NASA Langley Research Center

**Atmospheric Flight Mechanics**
**Chris Cotting,** U.S. Air Force Test Pilot School

**Communications Systems**
**Eric Butte,** Lockheed Martin

**Computer Systems**
**Chiping Li,** Air Force Office of Scientific Research

**Design Engineering**
**Lisa Saam,** ATA Engineering, Inc.

**Digital Avionics**
**Maarten Uijt de Haag,** Ohio University

**Dynamics Specialists**
**Joseph Slater,** Wright State University

**Education**
**K. Ravindra,** St. Louis University

**Fluid Dynamics**
**Melissa Green,** Syracuse University

**Gas Turbine Engines**
**Guillermo Paniagua,** Purdue University

**Green Engineering**
**Larry Leavitt,** NASA Langley Research Center

**Ground Test**
**Stephanie Simerly,** NASA Glenn Research Center

**Guidance, Navigation, and Control**
**Leena Singh,** C.S. Draper Laboratory

**High Speed Air Breathing Propulsion**
**Dan Paxson,** NASA Glenn Research Center

**History**
**Kevin Burns,** Northrop Grumman Corporation

**Information and Command & Control Systems**
**Mike Sotak,** Kratos Defense

**Intelligent Systems**
**Nisar Ahmed,** University of Colorado, Boulder

**Materials**
**Mohammad Naraghi,** Texas A&M University

**Meshing Visualization and Computational Environments**
**John Dannenhoffer,** Syracuse University

**Modeling and Simulation Technologies Conference**
**Alaa Elmiligui,** NASA Langley Research Center

**Multi-Disciplinary Design Optimization**
**Edward Alyanak,** Air Force Research Laboratory

**Non-Deterministic Approaches**
**Masoud Rais-Rohani,** Mississippi State University

**Plasmadynamics and Lasers**
**Subrata Roy,** University of Florida

**Propellants and Combustion**
**James Gord,** Air Force Research Laboratory

**Sensor Systems**
**Domenico Accardo,** Università degli Studi di Napoli "Federico II

**Small Satellites**
**Jeremy Straub,** University of North Dakota

**Society and Aerospace Technology**
**Bradley Steinfeldt,** Sandia National Laboratories

**Software**
**Chris Thames,** NASA Langley Research Center

**Space Resources Utilization Symposium**
**Julie Kleinhenz,** NASA Glenn Research Center

**Space Exploration and Operations**
**Shirley Tseng,** Tseng, LLC

**Spacecraft Structures**
**Samuel "Case" Bradford,** Jet Propulsion Laboratory

**Structural Dynamics**
**Jack McNamara,** The Ohio State University

**Structures**
**Peter Gustafson,** Western Michigan University

**Student Paper Competition- AD&S**
**Dawn Phillips,** NASA Marshall Space Flight Center

**Survivability**
**Julian Rimoli,** Georgia Institute of Technology

**Systems Engineering**
**John Hsu,** California State University, Long Beach

**Terrestrial Energy**
**Sivaram Arepalli,** National Institute of Aerospace

**Thermophysics**
**Michael Martin,** Department of Energy

**Unmanned Systems**
**Richard Stansbury,** Embry-Riddle Aeronautical University

**Wind Energy Symposium**
**Matthew Churchfield,** National Renewable Energy Laboratory

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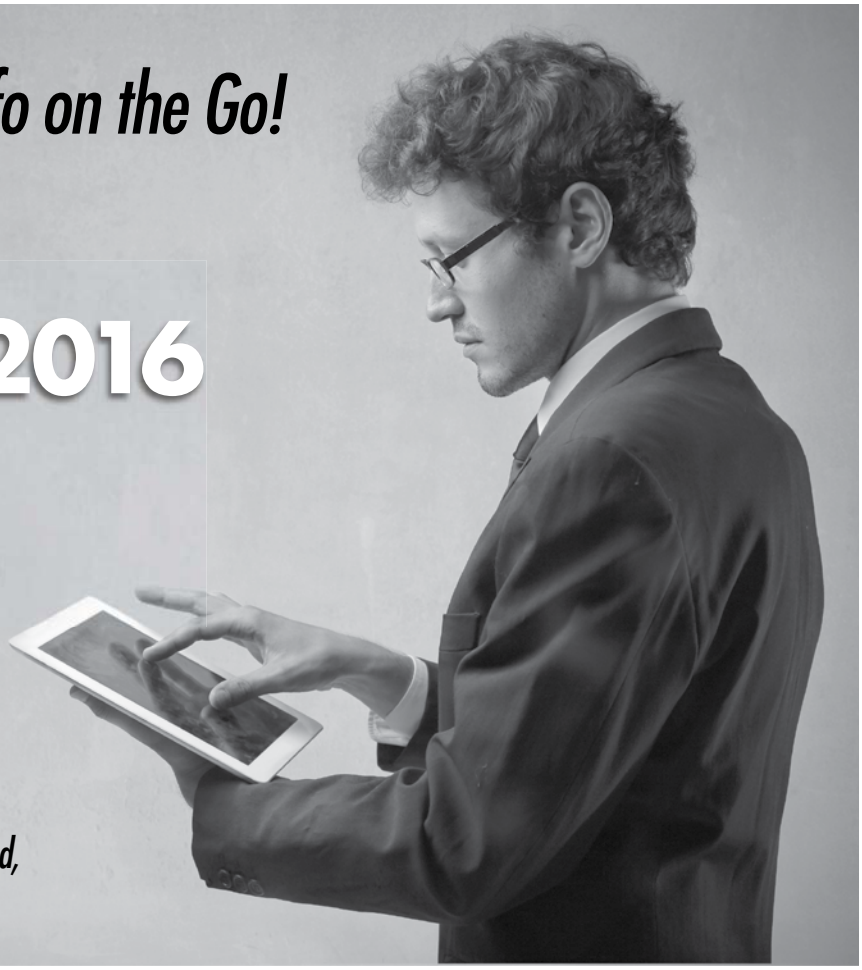

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## FEATURES

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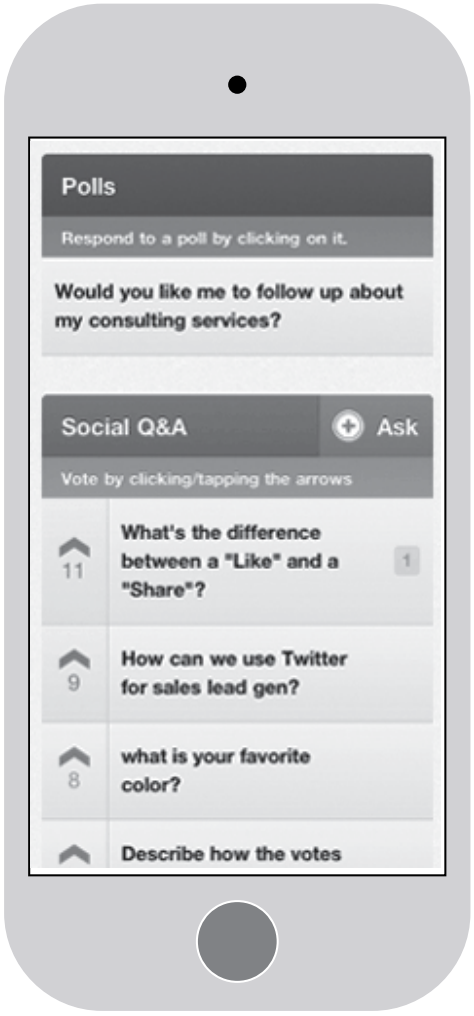
## During Plenary and Forum 360 Sessions, go to aiaa.cnf.io




### Getting Your Question Answered is as EASY as 1-2-3!

1. Click the "Ask" button to submit a question.
2. Check out the questions that other attendees are asking.
3. If you see a question that you want answered, click on the arrow on the left. The most popular questions automatically rise to the top.

### Participate in Session Polls

1. If Polls are available they will appear at the top of the page. Simply click/tap on a Poll to respond.
2. Choose your response(s) and hit "submit".
3. After responding you will be able to see the results on your own device!*

   ** Some Poll results may be hidden*

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# Forum Overview

| | SATURDAY/SUNDAY 2–3 January | MONDAY 4 January | | | TUESDAY 5 January | | |
|---|---|---|---|---|---|---|---|
| 0730 hrs | | Speakers' Briefing | | | Speakers' Briefing | | |
| 0800 hrs | **Continuing Education Courses and Workshop 0815–1700 hrs** *Saturday and Sunday* | **Opening Plenary Panel** | | | **Plenary Panel** | | |
| 0830 hrs | | | | | | | |
| 0900 hrs | | **NDA Lecture** | **Technical Sessions** | Networking Coffee Break | **ASC Lecture** | **Technical Sessions** | Networking Coffee Break |
| 0930 hrs | | | | **Forum 360** | | | **Forum 360** |
| 1000 hrs | | | | | | | |
| 1030 hrs | | | | | | | |
| 1100 hrs | | | | | | | |
| 1130 hrs | | | | | | | |
| 1200 hrs | | | | | | | |
| 1230 hrs | | Networking Lunch On Own<br>Concessions open in Seaport Foyer | **Durand Lectureship for Public Service and Luncheon** *Sponsored by Lockheed Martin* | | **Recognition Luncheon: Celebrating Achievements in Aerospace Sciences and Information Systems** | | Networking Lunch On Own |
| 1300 hrs | | | | | | | |
| 1330 hrs | | | | | | | |
| 1400 hrs | | **SCS Lecture** | **Technical Sessions** | **Forum 360** | **DSC Lecture** | **Technical Sessions** | **Forum 360** |
| 1430 hrs | | | | | | | |
| 1500 hrs | | | | | | | |
| 1530 hrs | **Student/Young Professionals Networking** *Sunday* | Networking Coffee Break | | | Networking Coffee Break *Sponsored by Bastion Technologies* | | |
| 1600 hrs | | | | | **Rising Leaders in Aerospace Leadership Exchange – Speed Mentoring (1545–1715 hrs)** *Sponsored by Northrop Grumman* | | |
| 1630 hrs | | | | | | | |
| 1700 hrs | | | | | | | |
| 1730 hrs | | | | **AIAA Governance Update** | **Dryden Lectureship in Research** | | |
| 1800 hrs | **Student Welcome Reception** *Sunday* *Sponsored by The Boeing Company* | | | | | | |
| 1830 hrs | | **Associate Fellows Reception** | **Rising Leaders in Aerospace Reception** *Sponsored by Honda Aircraft Company* | | **Opening Reception in Exposition Hall** *Hall opens at 1815 hrs* | | |
| 1900 hrs | | | | | | | |
| 1930 hrs | | **AIAA Associate Fellows Dinner (Tickets Required)** | | | | | |
| 2000 hrs | | | | | | | |
| 2030 hrs | | | | | | | |
| 2100 hrs | | | | | | | |
| 2130 hrs | | | | | | | |
| 2200 hrs | | | | | | | |
| 2230 hrs | | | | | | | |

# Forum Overview

## WEDNESDAY 6 January

- 0730 hrs: Speakers' Briefing
- 0800 hrs – 0830 hrs: **Keynote**
- 0900 hrs: Networking Coffee Break in Exposition Hall
- 0930 hrs – 1000 hrs: **AV Week Annual Workforce Survey Results** *Supported by Rising Leaders in Aerospace*
- 0900 hrs – 1030 hrs: **Technical Sessions**
- 0930 hrs – 1100 hrs: **Forum 360**
- 0930 hrs – 1530 hrs: **Exposition Hall Open** *Hall opens at 0845 hrs*
- 1230 hrs – 1330 hrs: **Luncheon in Exposition Hall**
- 1400 hrs – 1530 hrs: **Forum 360**
- 1530 hrs: Networking Coffee Break in Exposition Hall
- 1530 hrs – 1700 hrs: **Technical Sessions**
- 1600 hrs – 1700 hrs: **Corporate Member Reception**
- 1730 hrs – 1830 hrs: **SDM Lecture**

## THURSDAY 7 January

- 0730 hrs: Speakers' Briefing
- 0800 hrs – 0830 hrs: **Plenary Panel**
- 0900 hrs – 1130 hrs: **Technical Sessions**
- 0900 hrs: Networking Coffee Break in Exposition Hall
- 0930 hrs – 1130 hrs: **Forum 360**
- 0930 hrs – 1330 hrs: **Exposition Hall Open** *Hall opens at 0845 hrs*
- 1200 hrs – 1300 hrs: **Recognition Luncheon: Celebrating Achievements in Aerospace Design/ Structures, Outstanding Educators, and Literary Excellence**
- 1200 hrs – 1330 hrs: **Rising Leaders in Aerospace–Lunch and Learn with Test Pilot Tucker Hamilton**
- 1230 hrs – 1330 hrs: Networking Lunch On Own; Concessions open in Exposition Hall
- 1400 hrs – 1530 hrs: **Technical Sessions**
- 1400 hrs – 1530 hrs: **Forum 360**
- 1530 hrs: Networking Coffee Break
- 1730 hrs – 1900 hrs: **Women at Scitech Happy Hour and Keynote** *(open to all attendees)*

## FRIDAY 8 January

- 0730 hrs: Speakers' Briefing
- 0800 hrs – 0830 hrs: **Keynote**
- 0900 hrs: Networking Coffee Break
- 0900 hrs – 1530 hrs: **Technical Sessions**

# Sponsors and Supporters

AIAA would like to thank the following organizations for their support of AIAA SciTech 2016:

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# Keynote Speakers and Plenary Sessions

Get the big picture on science and technology from the leading authorities in the field during these high-level discussions and presentations.

## Monday, 4 January

**0800–0900 hrs** **Seaport A-E**

### Opening Plenary

***Aerospace Science and Technology Policy in the 2016 Political Arena***

Moderator: **Courtney Stadd,** Management Advisor, Catalyst Partners, LLC

Panelists:

**Mark Albrecht,** Chairman of the Board, USSpace, LLC

**Carissa Christensen,** Managing Partner, The Tauri Group

**Jacques Gansler,** Founder, Chair, and CEO, The Gansler Group

**Daniel Goldin,** Chairman, President & CEO, Intellisis Corporation

**Timothy Persons,** Chief Scientist, U.S. Government Accountability Office

### A "MUST ATTEND" EVENT FOR ALL MEMBERS

**1730–1830 hrs** **Seaport A-E**

### AIAA Governance Update

***The Future of AIAA: Why Governance Matters to You***

**James F. Albaugh,** President, AIAA

This session will detail the proposed changes to the Institute's constitution recommended by the Governance Working Group and endorsed by the Board of Directors. Jim Albaugh will introduce a forward-thinking governance structure that is essential to positioning AIAA to be a proactive organization—shaping the future of aerospace for decades to come. He will discuss the voting process that will begin in March and why your involvement is so important. Please join us!

## Tuesday, 5 January

**0800–0900 hrs** **Seaport A-E**

### Opening Plenary

***Aerospace Generations – Lessons Learned from a Half Century of Innovation in Aerospace Technology***

Moderator: **Mason Peck,** Associate Professor, Sibley School of Mechanical and Aerospace Engineering, Cornell University

Panelists:

**William A. Anders,** U.S. Air Force (ret.)

**Zac Manchester,** Postdoctoral Fellow, Agile Robotics Laboratory, Harvard University

**Hans Mark,** Professor Emeritus, The University of Texas, Austin

**Mary Popp,** Propulsion Engineer, Lockheed Martin Corporation

## Wednesday, 6 January

**0800–0900 hrs** **Seaport A-E**

### Opening Plenary

***Designing for Resilience***

**Jeff Holland,** Director, U.S. Army Engineer Research and Development Center

## Thursday, 7 January

**0800–0900 hrs** **Seaport A-E**

### Opening Plenary

***Aerospace Frontiers – Strengthening Collaboration For Continued Progress***

Moderator: **John Tracy,** Chief Technology Officer and Senior Vice President, Engineering, Operations and Technology, The Boeing Company

Panelists:

**Morteza Gharib,** Hans W. Liepmann Professor of Aeronautics and Bioinspired Engineering, Vice Provost, California Institute of Technology

**Keoki Jackson,** Chief Technology Officer, Lockheed Martin Corporation

**Sandy Magnus,** Executive Director, AIAA

**Darryll Pines,** Professor, University of Maryland

**Jaiwon Shin,** Associate Administrator, Aeronautics Research Mission Directorate, NASA

**Steve Walker,** Deputy Director, DARPA

## Friday, 8 January

**0800–0900 hrs** **Seaport A-E**

### Opening Plenary

***Commercial Use of Unmanned Systems***

**Treggon Owens,** Founding Partner & CEO, Aerial MOB, LLC

# Forum 360

FORUM 360°

These conversations will cover a spectrum of timely topics including programs, systems, policy, operations, applications, platforms and more!

## Monday, 4 January

**0930–1130 hrs** **Seaport F-G**

### Distilling Your Message: Putting Yourself Back into Your Science and Engineering

Moderator: **Christine O'Connell,** Associate Director, Alan Alda Center for Communicating Science, Stony Brook University

**1400–1600 hrs** **Seaport F-G**

### Research Enabling and Enabled by a Cis-Lunar One-year Mission

Moderator: **Michael Moloney,** Director for Space and Aeronautics, Space Studies Board and the Aeronautics and Space Engineering Board, National Academies of Sciences, Engineering, and Medicine

## Tuesday, 5 January

**0930–1130 hrs** **Seaport F-G**

### Innovation in Space—How Researchers Can Leverage the ISS National Laboratory for Pioneering Research & Development

Moderator: **Gregory Johnson,** President and Executive Director, Center for the Advancement of Science in Space (CASIS)

Panelists:

**Dan Blaettler,** Senior Program Manager, Center for the Advancement of Science in Space (CASIS)

**George Nelson,** Manager, ISS Technology and Science Research Office, NASA Johnson Space Center

**Andrew Rush,** President, Made In Space, Inc.

**1400–1600 hrs** **Seaport F-G**

### Cybersecurity Below 30,000 Feet—Applying Lessons from Other Industries

Moderator: **Chan D. Lieu,** Senior Legislative Advisor, Venable, LLP

Panelists:

**Jeffrey Carr,** CEO, Taia Global

**Scott Erven,** Associate Director, Protiviti

**Jake Olcott,** Vice President, Business Development, BitSight

## Wednesday, 6 January

**0930–1130 hrs** **Seaport F-G**

### Additive Manufacturing – Applications and Opportunities for the Aerospace Industry

Moderator: **Robert Yancey,** Vice President, Aerospace & Composites, Altair Engineering

Panelists:

**Greg Arend,** Additive Manufacturing Development Leader, United Launch Alliance

**Jason Dunn,** Co-Founder and CTO, Made In Space

**Franck Mouriaux,** General Manager, Structures, RUAG Schweiz AG, RUAG Space

**Chauncey Wu,** Structural Mechanics and Concepts Branch, NASA Langley Research Center

**1400–1600 hrs** **Seaport F-G**

### Space Exploration Through Advancing Technologies

Moderator: **Steve Gaddis,** Director, Game Changing Development Program, NASA

Panelists:

**Molly Anderson,** Principal Technologist, Next Gen Life Support, NASA

**Michelle Munk,** Principal Technologist, Entry, Descent, and Landing, NASA

**Matthew Simon,** Habitat Design Lead, Human Spaceflight Architecture Team, NASA

# Forum 360

## Thursday, 7 January

**0930–1130 hrs** **Seaport F-G**

### Putting the E in STEM

Moderator: **Meredith Drosback,** Assistant Director for Education and Physical Sciences, Office of Science and Technology Policy, Executive Office of the President

Panelists

**Edward J. Coyle,** John B. Peatman Distinguished Professor of Electrical and Computer Engineering, Georgia Institute of Technology

**Thea Sahr,** Director of Programs, DiscoverE

**1400–1600 hrs** **Seaport F-G**

### Learning from Hollywood

Moderator: **Rick Loverd,** Program Director, The Science & Entertainment Exchange, National Academies of Science, Engineering, and Medicine

# Forum 360

RISING LEADERS in AEROSPACE

This multidimensional program features a leadership exchange/speed mentoring, panel session, Q&A with top industry leaders, and multiple opportunities for networking. These exciting and energetic activities will provide access to top aerospace leaders and their perspectives, with subject matter relevant to your career stage.

## Monday, 4 January

**1830–1930 hrs** **Seaport H**

### Reception

The reception will kick off the Rising Leaders in Aerospace events and is a perfect opportunity for young leaders to mingle with others who will be participating at AIAA SciTech as attendee, presenter, or veteran professional. Come meet other participants in a casual environment. You're bound to see them again at the Speaker, Networking, or Panel event.

**Sponsored by:** HondaJet

## Tuesday, 5 January

**1545–1715 hrs** **Seaport H**

### Leadership Exchange – Speed Mentoring

A networking event for young aerospace leaders, age 35 and under.

Mentors include:

**Mike Griffin,** Schafer Corporation
**James Kenyon,** Pratt & Whitney
**Sandy Magnus,** AIAA
**Dimitri Mavris,** Georgia Institute of Technology
**Timothy Persons,** U.S. Government Accountability Office
**Mary Popp,** Lockheed Martin Corporation
**Masoud Rais-Rohani,** Mississippi State University
**Al Romig,** National Academy of Engineering
**Ash Sater,** eddi app
**Sarah Shull,** NASA Johnson Space Center
**Courtney Stadd,** Catalyst Partners, LLC
**Julie Van Kleeck,** Aerojet Rocketdyne

**Sponsored by :** NORTHROP GRUMMAN

## Wednesday, 6 January

**1000–1100 hrs** **Seaport H**

### *Aviation Week* Annual Workforce Survey Results

Every year *Aviation Week* conducts a survey on the aerospace workforce. The most recent survey had information that is extremely relevant to younger professionals, including work-life balance. This panel will include an *Aviation Week* executive who helped conduct the survey as well as several others who were heavily involved.

Come and get a "Reality Check as Competition for Talent Increases."

Moderator: **Carole Rickard Hedden,** Executive Editorial Director, Aviation Week Executive Intelligence

Panelists:

**Jim Adams,** Partner, PwC/Strategy&
**Clarke Havener,** Global Sector Leader A&D, Korn Ferry
**Lauren Smith,** Concept Development Engineer, Northrop Grumman Aerospace Systems

## Thursday, 7 January

**1200–1330 hrs** **Seaport H**

### Lunch and Learn with Test Pilot Tucker Hamilton

Keynote Speaker: **MAJ Tucker Hamilton,** Experimental Fighter Test Pilot, United States Air Force

Tucker Hamilton is an experimental test pilot for the U.S. Air Force. He will be sharing his presentation: "Making a Difference at Mach 2." He'll share what it is like to be an experimental fighter test pilot, and share his personal stories including major life-threatening aircraft accidents, close saves, combat flying revelations, serendipitous opportunities testing first-of-its-kind technology, flying over 30 aircraft from a zeppelin to a MiG-15 to an A-10, and managing the Joint Strike Fighter Developmental Test program for all three services. Through these experiences you will learn not just what a Test Pilot does, but also gain encouragement through lessons learned on how to make a difference in your local communities. And did we mention cool flight test videos!

Box lunches will be available for the first 125 young professionals who attend.

# Special Sessions and Events

## Monday, 4 January

**1230–1400 hrs** **SeaportA-E**

### Durand Lectureship for Public Service and Luncheon

***Thoughts on Complex Systems Solutions in the 21st Century***

**Ronald M. Sega,** Colorado State University

**Sponsored by:** LOCKHEED MARTIN

**Reception: 1830–1915 hrs** **Seaport Foyer**
**Dinner: 1930–2230 hrs** **Seaport F-G**

### 2016 Associate Fellows Recognition Ceremony and Dinner (Ticketed Event)

Each year, the Institute recognizes exemplary professionals for their accomplishments in engineering or scientific work, outstanding merit and contributions to the art, science, or technology of aeronautics or astronautics.

The Class of 2016 Associate Fellows will be officially recognized during the Associate Fellows Recognition Ceremony and Dinner on Monday evening, 4 January 2016.

Please support your colleagues, and join us for the induction of the 2016 Associate Fellows. Tickets to this celebrated event are available on a first-come, first-served basis and can be purchased for $100 via the AIAA SciTech 2016 registration form, the 2016 Associate Fellow Dinner event registration form, or on site (based on availability).

## Tuesday, 5 January

**1730–1830 hrs** **Seaport F-G**

### Dryden Lectureship in Research

***Blended Wing Body Technology Readiness***

**Robert H. Liebeck,** Senior Technical Fellow, The Boeing Company

## Thursday, 7 January

**1730–1930 hrs** **Seaport F-G**

### Women at SciTech Happy Hour and Keynote

**Ann Zulkosky,** Lockheed Martin Space Systems Company

To celebrate women's accomplishments in aerospace and aeronautics and to provide an opportunity for women to network and share their experiences, AIAA and the AIAA Diversity Working Group are cosponsoring the "Women at SciTech Happy Hour and Keynote." The event is open to everyone.

# Educational Events

AIAA is committed to keeping aerospace professionals at their technical best, and provides an ongoing source of learning, community, professional connections, and career development. Gain the knowledge you need to excel in your field or to move confidently into a new one. Learn how to interact with students and teachers, and help inspire the next generation of aerospace leaders.

## Tuesday, 5 January

### Career Workshop: Communications and Connections for Your Career

Need to find a competitive edge to advance in your career? Wondering what skills you should develop and leverage to take the next steps? The Communications and Connections for Your Career workshop at AIAA SciTech 2016 will provide some building blocks to help you—whether you are starting out in your career, looking to move up the ladder in your organization, or wanting a refresher on some core skills.

**0915–1000 hrs** **Vista AB**

### Technical Writing

Presenter: **Paul Park,** Retired Chief Engineer, Lockheed Martin Aeronautics

Technical writing is rarely taught in college engineering programs, therefore students enter the workforce without effective writing skills. This session will present basic techniques for creating clear, succinct, and effective technical prose.

**1000–1115 hrs** **Vista AB**

### Presentation Skills

Presenter: **May-chen Martin-Kuo,** Senior Scientist, Spreadtrum Communications, Inc., and District Director, Toastmasters International District 5

Making your point clearly, succinctly, and with impact is important to your career development. This session will cover key elements in making effective presentations, including:

- Developing & Delivering Presentation – Avoiding Death by PowerPoint
- Elevator Speech – Making a Point in 3 Minutes or Less
- Engaging the Audience – They Snooze, You Lose

**1100-1200 hrs** **Vista AB**

### Striking Out on Your Own or Within an Organization

Are you ready to strike out on your own? This session will feature a panel of entrepreneurs and intrepreneurs—innovating within a large corporation. Panelists will share their experiences and thoughts about how they took the leap and how they have effected change within our industry.

Moderator: **Bob Wessels,** Subcontracts Program Senior Manager, Lockheed Martin Space Systems Company

Panelists include:
**Alan Cain,** President, Innovative Technology Applications Company, LLC

**Jane Hansen,** President, HRP Systems, Inc.

**Brett Hoffstadt,** PMP, Project Manager, 3Sixty Integrated

**Dave Mitchell,** President, Mitchell Aerospace Research

**1500–1545 hrs** **Vista AB**

### Making the Most of Networking

Networking is an important skillset to help advance your career. This session will highlight how effective networking can impact your career positively. Panelists will share their experiences and provide tips about how best to develop and utilize your networks.

#### *Panel Discussion: Networking Experiences That Benefited My Career*

Moderator: **Bob Wessels,** Subcontracts Program Senior Manager, Lockheed Martin Space Systems Company

Panelists include:
**Larry Brase,** Technical Fellow/Senior Manager, The Boeing Company

**Basil Hassan,** Senior Manager, Sandia National Laboratories

**Laura McGill,** Vice President, Engineering, Raytheon Company

**Bob Wessels,** Subcontracts Program Senior Manager, Lockheed Martin Space Systems Company

## Tuesday, 5 January (continued)

**1630–1730 hrs** **Regatta B**

### Membership Matters: How Far Will You Go?

Did you know there are six grades of AIAA membership spanning from Student Member to Honorary Fellow? Membership elevation is a step toward recognition of one's professional status and accomplishments. In this panel session, hosted by the AIAA Diversity Working Group, learn how to apply for and encourage nomination of members who qualify for membership advancements.

Moderators: **Susan Frost,** Research Scientist, NASA Ames Research Center, and **Hsiao-hua Burke**, Principal Staff, MIT-Lincoln Lab

Panelists include:

**Luisella Giulicchi,** Spacecraft Engineering and AIV Manager, European Space Agency

**Basil Hassan,** Senior Manager, Sandia National Laboratories

**Achille Messac,** Professor, Mississippi State University

**Helen L. Reed,** Professor, Texas A&M University

**Mary L. Snitch,** Senior Manager, Lockheed Martin

## Wednesday, 6 January

**1830–2000 hrs** **Harbor A**

### Crawford Slip Method Workshop on Networking

This will be an interactive exchange on networking, unlike anything you've ever experienced. Participants will not be pushed into parlor games, or set up with touchy-feely interviews. Oddly, you will be tasked to write furiously during an intensive 90-minute session in complete SILENCE! Then a presentation and discussion will commence for the final half hour. Your efforts will result in an AIAA pamphlet: "How to Network at a Conference."

Please come prepared to closely follow very precise directions. This will ensure your ideas are faithfully captured, so that your problems and issues with networking get solved.

An ability to write simple, direct sentences in the English language is required.

# Networking Events

Understanding the importance of networking with colleagues new and old, a series of activities have been planned that will help you connect with current colleagues and new acquaintances.

## Student/Young Professionals Networking

**Sunday, 3 January 1530–1700 hrs** **Promenade AB**

This will be an opportunity for students to speak directly with young professionals in the aerospace industry. This unique opportunity will provide students with the ability to ask questions about transitioning from the university to the workplace. Find out from those who have made the transition within the past 3–10 years about the process. Find out what they wish they had known then. Connect with people in the industry who have a firm grasp of exactly what you might be feeling and wondering.

## Student Welcome Reception

**Sunday, 3 January, 1800–1930 hrs** **Seaport H**

AIAA SciTech has the largest gatherings of students of all of the AIAA forums. Come meet fellow students who you are sure to see again throughout the week. Many student award winners and presenters will be in attendance. Also, Executive Director Sandy Magnus will address the attendees, as will a representative from the corporate sponsors. All attendees are welcome.

Members of the AIAA Board of Directors and the Technical Activities Committee will also be in attendance. Take advantage of this chance to meet AIAA key members and learn about opportunities that are available.

**Sponsored by:** BOEING

## Concessions

Cash-only concessions will be offered on the following days and locations:

Monday, 4 January, 1230–1400 hrs, in the Seaport Foyer on the 2nd level of the Hyatt.

Thursday, 7 January, 1200–1400 hrs, in the Exposition Hall on the lobby level of the Hyatt.

## Networking Coffee Breaks

Coffee breaks allow even more time for making new contacts, continuing discussions from sessions, visiting the Exposition Hall, or checking emails and voicemails to keep in touch with the office while you are at the forum. Coffee breaks will be located in the following locations and times:

| | |
|---|---|
| **Monday, 4 January** | **0700, 0900, and 1530 hrs; Session Room Foyers** |
| **Tuesday, 5 January** | **0700, 0900, and 1530 hrs; Session Room Foyers** |
| | **Sponsored by:** BASTION TECHNOLOGIES |
| **Wednesday, 6 January** | **0700 hrs; Session Room Foyers**<br>**0900, 1530 hrs; Exposition Hall** |
| **Thursday, 7 January** | **0700 and 1530 hrs; Session Room Foyers**<br>**0900 hrs; Exposition Hall** |
| **Friday, 8 January** | **0700 and 0900 hrs; Session Room Foyers** |

## Opening Reception

**Tuesday, 5 January** **Exposition Hall**
**1815–2000 hrs**

Take this opportunity to engage new contacts and refresh old ones. A ticket for the reception is required and included in the registration fee where indicated. Additional tickets for guests may be purchased upon registration or on site, as space is available.

**Come join us for the SciTech specialty cocktail: the CosmicRita!**

# Networking Events

## Luncheon in the Exposition Hall

**Wednesday, 6 January** **Exposition Hall**
**1230–1400 hrs**

A ticket is required and is included in the registration fee where indicated.

## Women at SciTech Happy Hour and Keynote

**Thursday, 7 January** **Seaport F-G**
**1730–1930 hrs**

**Ann Zulkosky,** Lockheed Martin Space Systems Company

To celebrate women's accomplishments in aerospace and aeronautics and to provide an opportunity for women to network and share their experiences, AIAA and the AIAA Diversity Working Group are cosponsoring the "Women at SciTech Happy Hour and Keynote." The event is open to everyone.

## USS *Midway* Museum Tour

**Friday, 8 January** **1245 hrs**

The AIAA San Diego Section has organized a self-guided tour of the USS *Midway* Museum. Fellow AIAA members and AIAA SciTech attendees should meet near the Registration desk and then walk to the USS *Midway* (5–7 minutes) for a "group" tour of the USS *Midway*.

If you did not get a chance to purchase tickets ahead of time online, just stop by the San Diego Section booth in the Exposition Hall as they will have some available for purchase.

**AIAA SciTech 2016 Attendees: $14**

**AIAA San Diego Members: $14**

**Students: $13**

**Nonmembers: $17**

# Recognition Events

Join with AIAA throughout the forum as we celebrate our industry's discoveries and achievements from the small but brilliantly simple innovations that affect everyday lives to the major discoveries and missions that fuel our collective human drive to explore and accomplish amazing things.

## Monday, 4 January

**0900–1000 hrs** **Harbor A**

### Non-Deterministic Approaches Lecture

***A Bayesian Framework for Assessment of Model Uncertainty***

**Armen Der Kiureghian,** President, American University of Armenia; Taisei Professor of Civil Engineering Emeritus, University of California, Berkeley

**1400–1500 hrs** **Harbor A**

### Spacecraft Structures Lecture

***Technology Development and Infusion for the James Webb Telescope Sun Shield***

**James Moore,** Division Vice President, ManTech (NeXolve)

**1530–1730 hrs** **Harbor A**

### Spacecraft Structures Panel

***Infusing New Structures Technology Into Space Systems***

Moderators: **W. Keith Belvin,** NASA Langley Research Center and **Greg Agnes**, Jet Propulsion Laboratory, California Institute of Technology

**Reception: 1830–1915 hrs** **Seaport Foyer**
**Dinner: 1930–2230 hrs** **Seaport F-G**

### 2016 Associate Fellows Recognition Ceremony and Dinner

Each year, the Institute recognizes exemplary professionals for their accomplishments in engineering or scientific work, outstanding merit and contributions to the art, science, or technology of aeronautics or astronautics.

Members of the Class of 2016 Associate Fellows will be officially recognized during the Associate Fellows Recognition Ceremony and Dinner.

A ticket for the dinner is required and not included in the registration fee. Additional tickets for guests may be purchased upon registration or on site, as space is available.

## Tuesday, 5 January

**0900–1000 hrs** **Harbor A**

### Adaptive Structures Lecture

***Adaptive Aerospace Structures – An Air Force Perspective***

**Gregory W. Reich,** Air Force Research Laboratory, AFRL/RQVC

**1030–1230 hrs** **Harbor A**

### Adaptive Structures Panel

***Where's My Morphing Aircraft? Reflections Based on Twenty Years of Adaptive Aerostructures***

Moderator: **Farhan Gandhi,** Rosalind and John J. Redfern Jr. '33 Endowed Chair in Aerospace Engineering, and Aerospace Program Director, Rensselaer Polytechnic Institute

Panelists:

**Jayanth Kudva,** NextGen Aeronautics

**Daniel Newman,** The Boeing Company

**Friedrich Straub,** The Boeing Company

**Edward White,** The Boeing Company

## Tuesday, 5 January (continued)

**1230–1400 hrs** **Seaport A-E**

### Recognition Luncheon: Celebrating Achievements in Aerospace Sciences and Information Systems

A ticket for the luncheon is required and included in the registration fee where indicated. Additional tickets for guests may be purchased upon registration or on site, as space is available.

**The following awards will be presented:**

#### Aerospace Guidance, Navigation and Control Award

**Kyle. T. Alfriend**

TEES Distinguished Research Chair Professor
Department of Aerospace Engineering
Texas A&M University
College Station, Texas

*"For significant lifetime contributions to spacecraft formation-flying technologies, fostering international scientific cooperation, and leadership to the aerospace guidance and control communities."*

#### deFlorez Award For Flight Simulation

**John M. Hanson**

Alternate Lead Systems Engineer, Space Launch System
NASA Marshall Space Flight Center
Huntsville Alabama

*"For outstanding innovations and contributions in flight simulation applications for launch vehicle design, development, and requirements verification."*

#### Intelligent Systems Award

**Frank L. Lewis**

Moncrief-O'Donnell Chair and Head, Advanced Controls and Sensors Group
University of Texas at Arlington Research Institute
Ft. Worth, Texas

*"For contributions to intelligent neural-adaptive control and highly influential textbooks that have advanced the capability of autonomous aircraft systems."*

#### Lawrence Sperry Award

**Joshua Rovey**

Associate Professor
Missouri University of Science & Technology
Rolla, Missouri

*"For exceptional contributions to research in the areas of plasmadynamics and space propulsion, and to the Missouri S&T AIAA Student Branch."*

#### Mechanics and Control of Flight Award

**Srinivas R. Vadali**

Professor, Department of Aerospace Engineering
Texas A&M University
College Station, Texas

*"For lasting contribution to the understanding of the relative motion of satellite formations and the control of this relative motion."*

#### Certificate of Merit for Best Papers: CFD Flow Visualization Showcase

**Most Artistic Flow Visualization Animation** — "The Effect of Initial Conditions on Streamwise Vortices in the Plane Turbulent Mixing Layer," AIAA 2015-2617, William A. McMullan and Stephen J. Garrett, University of Leicester.

**Most Quantitatively Descriptive Flow Visualization Animation** — "EPIC – An Extract Plug-In Components Toolkit for in-Situ Extracts Architecture," AIAA 2015-3410, Earl Duque and Daniel Hiepler, Intelligent Light; Robert Haimes, Massachusetts Institute of Technology; Christopher Stone, Computational Science and Engineering, LLC; Steven E. Gorrell, Matthew Jones, and Ronald A. Spencer, Brigham Young University

**Most Comprehensive Flow Visualization Animation** — "A Multi-Phase CFD Technique with Cavitation and Fluid-Structure Interaction," AIAA 2015-3419, Hong Q. Yang, CFD Research Corporation.

#### Computational Fluid Dynamics Student Best Paper

"Improving High-Order Finite Element Approximation Through Geometrical Warping," AIAA 2015-2605, Devina Sanjaya and Krzysztof Fidkowski, University of Michigan.

#### Guidance, Navigation and Control Best Paper

"Swarm Assignment and Trajectory Optimization Using Variable-Swarm, Distributed Auction Assignment and Model Predictive Control," AIAA 2015-0599, Daniel Morgan and Soon-Jo Chung, University of Illinois at Urbana-Champaign; and Fred Hadaegh, Jet Propulsion Laboratory.

#### Intelligent Systems Best Paper

"Trajectory Prediction and Alerting for Aircraft Mode and Energy State Awareness," AIAA 2015-1113, Kimberlee Shish, Millennium Engineering and Integration Company; John Kaneshige, Diana Acosta, Stefan Schuet, Avinash Madavan, NASA Ames Research Center; Thomas Lombaerts, German Aerospace Center (DLR); and Lynne Martin, San Jose State University.

#### Modeling & Simulation Best Paper

"A Coupled Lateral/Directional Flight Dynamics and Structural Model for Flight Control Design," AIAA 2015-0906, Ondrej Juhasz and Mark Tischler, NASA Ames Research Center; and Steven Hagerott, David Staples, and Javier Fuentealba, Textron Aviation.

# Recognition Events

## Tuesday, 5 January (continued)

**Announcement of Student Competition Winners**
Atmospheric Flight Mechanics
Guidance Navigation And Control

**1400–1500 hrs** **Harbor A**

### Dynamic Specialists Lecture

***The Curiosity/Mars Science Laboratory Sky-Crane Landing System***

**Jeffrey Umland,** Engineering Fellow, Jet Propulsion Laboratory

**1530–1730 hrs** **Harbor A**

### Dynamic Specialists Panel

***Panel Discussion and Open Forum on the 2nd Aeroelastic Prediction Workshop***

## Wednesday, 6 January

**1800–1900 hrs** **Seaport F-G**

### Structures, Structural Dynamics, and Materials Lecture

***Real-Life Problems are Multidisciplinary***

**Ivatury Raju,** Technical Fellow for Structures, NASA

## Thursday, 7 January

**1200–1400 hrs** **Seaport A-E**

### Recognition Luncheon: Celebrating Achievements in Aerospace Design/Structures, Outstanding Educators, and Literary Excellence

Speaker: **Michael Gazarik,** Technology Director, Ball Aerospace & Technologies Corp.

A ticket for the luncheon is required and included in the registration fee where indicated. Additional tickets for guests may be purchased upon registration or on site, as space is available.

**The following awards will be presented:**

**Aerospace Design Engineering Award**

**The Boeing Hypersonic Design/MDAO Team**
The Boeing Company
Huntington Beach, California
Award Accepted by Kevin Bowcutt, Team Lead

*"For the design of novel hypersonic vehicle concepts and development of the multidisciplinary analysis and optimization tools critical for success."*

**Faculty Advisor Award**

**Amrutur V. Anilkumar**
Professor, Department of Mechanical Engineering
Vanderbilt University
Nashville, Tennessee

*"For passionate promotion of novel aerospace design activities, community outreach and mentoring of students to success at national competitions and pursuit of aerospace engineering careers."*

**History Manuscript Award**

**Alexander C. MacDonald**
Program Executive for Emerging Space, Office of the Chief Technologist, NASA Headquarters
Civil and Commercial Space Division, NASA Jet Propulsion Laboratory

*"The Long Space Age: An Economic Perspective on the History of the American Space Exploration."*

**Pendray Aerospace Literature Award**

**David K. Schmidt**
Professor Emeritus, Department of Mechanical and Aerospace Engineering
University of Colorado-Colorado Springs
Colorado Springs, Colorado

*"For sustaining and influential contributions to aerospace literature in the area of aerospace vehicle dynamics and control, including the comprehensive textbook, Modern Flight Dynamics."*

**SDM Award**

**Anthony M. Waas**
Boeing-Egtvedt Endowed Chair,
Chairperson, William E. Boeing Department of Aeronautics and Astronautics,
University of Washington
Seattle Washington

*"For pioneering contributions to the development of innovative, experimentally validated, computational methods for progressive damage analysis of polymer and hot ceramic composite materials and structures."*

**Abe M. Zarem Award for Distinguished Achievement–Aeronautics**

**Ayodeji T. Bode-Oke**
University of Virginia
Charlottesville, Virginia

**AIAA Foundation Abe M. Zarem Educator Award**

**Haibo Dong**
Associate Professor, Mechanical and Aerospace Engineering
University of Virginia
Charlottesville, Virginia

# Recognition Events

## Thursday, 7 January (continued)

**1230–1400 hrs** **Seaport A-E**

### Recognition Luncheon: Celebrating Achievements in Aerospace Design/Structures, Outstanding Educators, and Literary Excellence

#### Certificate of Merit for Best Papers

#### ASME/Boeing Best Paper

"Computational Techniques for the Thermostructural Analysis of Composites" AIAA 2015-0462, Vinay Goyal, Jacob Rome, Matthew Conway, James Tuck-Lee and Steven Frolik, The Aerospace Corporation.

#### Collier Research Hypersizer/AIAA Structures Best Paper

"Mass Optimization of Variable Angle Tow, Variable Thickness Panels with Static Failure and Buckling Constraints" AIAA 2015-0452, Rainer MJ Groh and Paul Weaver, University of Bristol.

#### Spacecraft Structures Best Paper

"Recent Advances in Heliogyro Solar Sail Structural Dynamics, Stability, and Control Research," AIAA 2015-0431, William Wilkie, Jay Warren, Lucas Horta, Karen Lyle, and Jer-Nan Juang, NASA Langley Research Center; Samuel Gibbs and Earl Dowell, Duke University; and Daniel Guerrant and Dale Lawrence, University of Colorado, Boulder.

#### Announcement of Student Competition Winners

Jefferson Goblet Student Paper Award

The Harry H. and Lois G. Hilton Student Paper Award in Structures

Lockheed Martin Student Paper Award in Structures

American Society for Composites Student Paper in Composites Award

Southwest Research Institute Student Paper Award in Non-Deterministic Approaches

# Exposition Hall

The Exposition Hall is the hub of activity during this event—from seeing exhibitor displays to enjoying networking breaks and other functions. Some major networking events are held in the Exposition Hall to give attendees and exhibitors an opportunity to connect with partners, industry thought leaders, and collaborators who can help move your business forward.

## Exposition Hall Hours

| | |
|---|---|
| **Tuesday, 5 January Opening Reception*** | **1815–2000 hrs** |
| **Wednesday, 6 January** | **0845–1600 hrs** |
| **Luncheon*** | **1230–1400 hrs** |
| **Thursday, 7 January** | **0845–1400 hrs** |

*A ticket is required to attend.

## Concessions

Cash-only concessions will be offered on Thursday, 7 January, 1200–1400 hrs, in the Exposition Hall on the lobby level of the Hyatt.

## New This Year! Enter To Win A Full Conference Registration For AIAA SciTech 2017!

Complete the raffle ticket (behind your registration badge) and drop it off at any of the raffle boxes in the Exposition Hall. Winner will be notified by email and does not need to be present to win.

Raffle is open to all AIAA SciTech 2016 attendees. Employees/ contractors of the American Institute of Aeronautics and Astronautics or credentialed members of the media are not eligible to win.

## AIAA Pavilion

Stop by the AIAA Pavilion, located in the Exposition Hall, to browse publications and merchandise, learn about your membership benefits, and meet AIAA staff.

## AIAA Foundation

Come visit us in the AIAA Pavilion. Did you know that the AIAA Foundation is celebrating its 20th anniversary? To celebrate this milestone, we are asking our members to help us accomplish an amazing feat: if 10,000 members donate at least $20 each, we will raise $200,000. If you make your donation on site you will be entered into a drawing for a 2-night stay at the Gaylord Texan during AIAA SciTech 2017.* Winners will be announced at the plenary session on Friday. In addition, we are hosting a Silent Auction with some cool aerospace items up for bid. Come visit us at the AIAA Pavilion and check it out!

AIAA FOUNDATION
Advancing Aerospace

* *Please note: a donation is not necessary to be entered in the raffle.*

## 30% Off All Books at AIAA SciTech 2016

AIAA Publications is offering a special discount on all titles featured at AIAA SciTech 2016. Attendees can take advantage of a 30% discount off the list price of all books for sale at the AIAA Bookstore located in the AIAA Pavilion. This show special will only be available during the forum! Take advantage of these super savings and visit the AIAA Bookstore!

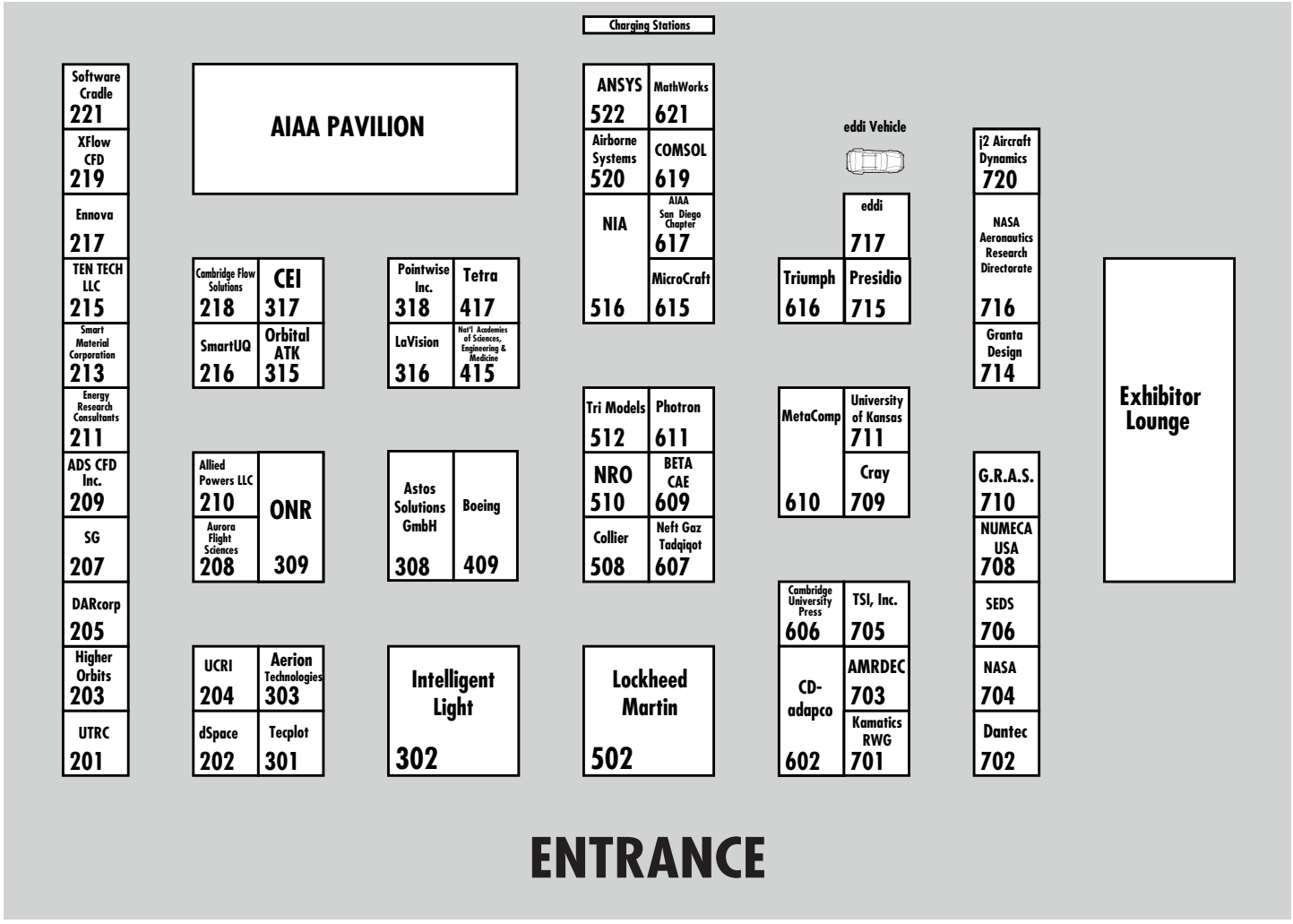
## Meet the Author Sessions

**Thomas R. Yechout**
*Introduction to Aircraft Flight Mechanics, 2E*
**Tuesday, 5 January**
**AIAA Pavilion**
Welcome Reception

**Leland M. Nicolai**
*Fundamentals of Aircraft and Airship Design, Vols. 1 & 2*
**AIAA Pavilion**
**Wednesday, 6 January 0900-0930; 1530-1600 hrs**
**Thursday, 7 January 0900-0930**

**Daniel P. Raymer**
*Aircraft Design, 5E and RDSWin Student*
**Wednesday, 6 January**
**AIAA Pavilion**
Luncheon

# Exposition Hall



# Exposition Hall

## Exhibitors by Booth Number (★indicates AIAA Corporate Members)

| | |
|---|---|
| 209 | ADS CFD Inc. |
| 303 | Aerion Technologies (formerly Desktop Aeronautics) |
| 617 | AIAA San Diego Section |
| 520 | Airborne Systems |
| 210 | Allied Powers LLC |
| 522 | ANSYS, Inc. |
| 308 | Astos Solutions GmbH |
| 208 | Aurora Flight Sciences |
| 609 | BETA CAE Systems USA, Inc. |
| 409 | Boeing Technology Services ★ |
| 218 | Cambridge Flow Solutions |
| 606 | Cambridge University Press |
| 602 | CD-adapco |
| 317 | Computational Engineering International (CEI) |
| 619 | COMSOL |
| 709 | Cray |
| 702 | Dantec Dynamics, Inc. |
| 205 | DARCorporation ★ |
| 202 | dSPACE ★ |
| 211 | Energy Research Consultants |
| 217 | Ennova-CFD |
| 714 | Granta Design |
| 710 | G.R.A.S. Sound & Vibration |
| 203 | Higher Orbits ★ |
| 508 | Hypersizer - Collier Research ★ |
| 302 | Intelligent Light ★ |
| 720 | j2 Aircraft Dynamics |
| 701 | Kamatics/RWG |
| 316 | LaVision, Inc. |
| 502 | Lockheed Martin Skunk Works® ★ |
| 621 | MathWorks |
| 610 | Metacomp Technologies |
| 715 | Micro Craft, Inc |
| 716 | NASA Aeronautics Research Directorate |
| 704 | NASA Space Technology Mission Directorate |
| 415 | National Academies of Science, Engineering, and Medicine |
| 516 | National Institute of Aerospace (NIA) ★ |
| 510 | National Reconnaissance Office (NRO) |
| 607 | JV Neft Gaz Tadqiqot |
| 720 | j2 Aircraft Dynamics |
| 708 | NUMECA USA, Inc. |
| 309 | Office of Naval Research |
| 315 | Orbital ATK ★ |
| 611 | Photron |
| 318 | Pointwise, Inc. ★ |
| 715 | Presidio Components Inc. |
| 706 | SEDS @ UCSD |
| 207 | SG — Space and Ground Engineering Solutions★ |
| 213 | Smart Material Corporation |
| 216 | SmartUQ |
| 221 | Software Cradle |
| 301 | Tecplot, Inc. ★ |
| 215 | TEN TECH LLC |
| 417 | Tetra Research Corporation |
| 512 | Tri Models, Inc. |
| 616 | Triumph Aerospace Systems — Newport News |
| 705 | TSI, Inc. |
| 201 | United Technologies Research Center (UTRC) |
| 204 | University of Cincinnati Research Institute (UCRI) |
| 711 | University of Kansas - Aerospace Short Course Program |
| 219 | XFlow CFD |

# Exhibitors

## ADS CFD Inc 209

60 Saint Timothy Court
Danville, CA 94526
www.adscfd.com
info@adscfd.com

ADS CFD is a provider of design and analysis software for the turbomachinery industry. Our software suite is built around the aerospace-class CFD solver, Code LEO. Organizations trust ADS CFD in the design of their radial and axial compressors and turbines when high fidelity and fast turnaround time are required.

## Aerion Technologies (formerly Desktop Aeronautics) 303

1900 Embarcadero Road
Suite 101
Palo Alto, CA 94303
www.desktopaero.com
sales@desktopaero.com

Aerion Technologies (formerly Desktop Aeronautics) creates tools for aerodynamic design and analysis of aerospace vehicles. Our flagship product, GoCart, is an intuitive aerial vehicle design tool built around NASA's renowned Cartesian Euler CFD solver, Cart3D. Our customer list includes the major players from the aerospace and defense industry.

## AIAA San Diego Section 617

PO Box 3898
San Diego, CA 92163-1898
www.aiaa-sd.org
chair@aiaa-sd.org

The San Diego Section was one of the earliest of groups in both the IAS and the ARS. Since these two groups merged in 1963, the San Diego section has been a vibrant organization hosting many national AIAA conferences and activities. We are now honored to be the host city for SciTech, and look forward to its return in future years.

## Airborne Systems 520

5800 Magnolia Avenue
Pennsauken, NJ 08109
www.airborne-sys.com
kurt.hempe@airborne-sys.com

Airborne Systems is the world leader in the design, development, fabrication, test and integration of Entry Descent and Landing Systems (EDLS), including parachutes systems, Air Bag Landing Attenuation systems, Inflatable Aerodynamic Decelerators. We provide EDLS systems for various aircraft and spacecraft and is leading the development of new technologies including Inflatable Aerodynamic Decelerators.

## ANSYS, Inc. 522

2600 ANSYS Drive
Cannonsburg, PA 15317
www.ansys.com
info@ansys.com

ANSYS provides simulation driven product development solutions to help companies meet their key business initiatives. We have solutions for optimizing aerodynamics, designing an environmental control system, working with multifunctional composites, creating next generation propulsion systems or developing millions of lines of embedded software.

## Astos Solutions GmbH 308

Meitnerstr. 8
Stuttgart, Germany 78089
www.astos.de
service@astos.de

Astos Solutions provides software and hardware solutions for mission and system concept analysis, spacecraft design and trajectory optimization, GNC/AOCS sizing and simulation, GNC/AOCS SCOE, pointing error engineering, real-time sensor simulation, gravity field identification, magnetic cleanliness, highly realistic space scenario visualization.

## BETA CAE Systems USA, Inc. 609

29800 Middlebelt Road
Suite #100
Farmington Hills, MI 48334
www.ansa-usa.com
support@ansa-usa.com

BETA CAE Systems is an engineering services company that distributes & supports the industry leading ANSA & META software. ANSA is a CAE pre-processing and morphing tool for FE & CFD Analysis, for full-model build, from CAD to solver input file, in one integrated environment.

## Boeing Technology Services 409

7755 E. Marginal Way S
Mail Code 1W-02
Seattle, WA 98108
www.boeing.com/bts

Boeing is the world's leading aerospace company, and employs more than 169,000 people around the world. Boeing Technology Services (BTS) is the point of access to more than 500 testing facilities across the US. BTS contracts with companies, educational institutions, and government organizations for use of Boeing laboratories.

# Exhibitors

## Cambridge Flow Solutions 218

**Compass House**
**Vision Park**
**Histon**
**Cambridge, Cambridgshire,**
**UK CB24 9AD**
**www.cambridgeflowsolutions.com/**
**webinquiries@cambridgeflowsolutions.com**

Cambridge Flow Solutions develops Boxer, a fully-scalable simulation environment encompassing advanced geometry, mesh generation and CFD software, tailored to complex applications and HPC. It is the power behind efficient higher-order LES solver technology, and behind BOXERMesh, the reliable and easy-to-use parallel mesh generation system.

## Cambridge University Press 606

**32 Avenue of the Americas**
**New York, NY 10013**
**www.cambridge.org/us/academic**
**marketing@cambridge.org**

Cambridge's publishing in books and journals combines state-of-the-art content with the highest standards of scholarship, writing and production. Visit our stand to browse new titles, available at a 20% discount, and to pick up sample issues of our journals. Visit our website to see everything we do: www.cambridge.org/us/academic.

## CD-adapco 602

**60 Broadhollow Road**
**Melville, NY 11747**
**www.cd-adapco.com**
**info@cd-adapco.com**

CD-adapco is the world's largest independent CFD focused provider of engineering simulation software, support and services. We have over 30 years of experience in engineering simulation. The scope of our activities extends well beyond software development to encompass a wide range of CAE engineering services in both CFD and FEA.

## Computational Engineering International 317

**2166 N. Salem Street**
**Apex, NC 27523**
**www.ceisoftware.com**
**sales@ceisoftware.com**

EnSight is a data visualization software used in CFD & FEA. EnSight is easy to learn, has a powerful calculator, Python scripting, batch and interactive usage & high quality graphics. New in EnSight 10.1 is case comparison, native polyhedral support, improved HPC model support, much faster particle rendering and many more enhancements.

## COMSOL 619

**1 New England Executive Park**
**Burlinton, Ma 01803**
**www.comsol.com**
**info@comsol.com**

COMSOL is a global provider of simulation software for product design and research to technical enterprises, research labs, and universities. Its COMSOL Multiphysics® product is an integrated software environment for creating physics-based models and simulation apps. A particular strength is its ability to account for coupled physics phenomena.

## Cray 709

**901 Fifth Avenue Suite 1000**
**Seattle, WA 981642**
**www.cray.com**
**info@cray.com**

Global supercomputing leader Cray builds innovative systems and solutions enabling researchers in academia, government, and industry to meet existing and future simulation and analytics challenges.

## Dantec Dynamics, Inc. 702

**750 Blue Point Road**
**Holtville, NY 11742**
**www.dantecdynamics.com**
**usa@dantecdynamics.com**

Dantec Dynamics is a leading developer and supplier of advanced measurement systems for fluid mechanics, solid mechanics, microfluidics, spray analysis and combustion technology. Our products include: PIV, CTA, LDA, PDA, PLIF, DIC, and more. Measurement data include velocity, turbulence, particle size, concentration, temperature, combustion species, strain/stress and vibration.

## DARCorp 205

**1440 Wakarusa Drive**
**Suite 500**
**Lawrence, KS 66049**
**www.darcorp.com**
**info@darcorp.com**

DARcorporation has been offering aeronautical engineering software and consulting services since 1991. Our projects include single/multi-engine propeller and jet powered aircraft, Business Jets, Very Light Jets (VLJ), Kit, LSA and Experimental aircraft, VTOL aircraft, UAVs for civil and military applications and hybrid air/ground vehicles.

# Exhibitors

## dSPACE 202

**50131 Pontiac Trail**
**Wixom, MI 48393-2020**
**www.dspaceinc.com**
**jbogert@dspace.com**

dSPACE is the world's leading provider of hardware and software tools for developing and testing sophisticated electronic control systems. dSPACE tools are used in high-performance engine development, navigation systems, propulsion, real-time flight maneuver simulation and other applications. Learn more at www.dspaceinc.com.

## Energy Research Consultants 211

**23342 South Pointe Drive, Suite E**
**Laguna Hills, CA 92653-1422**
**www.ERC-Ltd.com**
**Brown@ERC-Ltd.com**

ERC provides specialized measurement and engineering services to commercial and government clients. Non-intrusive diagnostic methods are used to measure reacting and non-reacting flow phenomena such as velocity, species, temperature, and droplet size, velocity and mass flux. Expertise ranges from the basic science to practical configurations.

## Ennova-CFD 217

**2150 Allston Way**
**Suite 250**
**Berkeley, CA 94704**
**www.ennova-cfd.com**
**info@ennova-cfd.com**

Leading edge grid generation software for computational fluid dynamics (CFD). Automated mesh generation for unstructured, structured and hybrid grids for internal and external flows.

## Granta Design 714

**300 Rustat House**
**62 Clifton Road**
**Cambridge, Cambridgeshire UK**
**CB1 7EG**
**www.grantadesign.com**
**info@grantadesign.com**

Granta Design is the materials information technology leader. Our materials data and information management solutions help aerospace enterprises to: manage data on composites, metals, and plastics; enable better materials decisions; reduce regulatory and environmental risk; and provide materials support for design, analysis, and simulation.

## G.R.A.S. Sound & Vibration 710

**2234 E Enterprise Parkway**
**Twinsburg, OH 44087**
**www.gras.us**
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From the beginning of GRAS, we have been involved in aerospace testing. Our dedication to aerospace partners to find new ways of testing – GRAS has become an integral part of the industry. From standard microphones, to customized flyover arrays, or for extreme sound pressures, we have the microphones which will help you develop tomorrow's airplanes.

## Higher Orbits 203

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**michelle@higherorbits.org**

Higher Orbits strives to launch students to higher levels of performance, leadership and teamwork by using the wonder of spaceflight to ignite a passion for Science, Technology, Engineering & Math (STEM). Mankind's journey into space serves as an ideal launchpad to excite students of all ages about STEM, Leadership and working to fulfill their dreams and ambitions.

## HyperSizer® - Collier Research Corporation 508

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**info@hypersizer.com**

As Collier Research Corporation's flagship product, HyperSizer Software performs design, stress analysis, and detail sizing optimization for aerospace vehicles fabricated with composite or metallic materials. On average, the software reduces the weight of structures by 20-40%, an exceptional achievement for aerostructures.

## Intelligent Light 302

**301 Route 17 N. 7th Floor**
**Rutherford, NJ 07070**
**www.ilight.com**
**sales@ilight.com**

Intelligent Light provides post-processing, data management and big data visualization capability for CFD. Thousands of users rely on the industry leading FieldView software and our custom engineering services to maximize their productivity and effectiveness. Let us help you eliminate bottlenecks and achieve breakthrough results.

# Exhibitors

## Kamatics/RWG 701

**1330 Blue Hills Ave**
**Bloomfield, CT 06002**
**www.kaman.com/engineered**
**John.bertolini@kaman.com**

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## LaVision, Inc. 316

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**www.lavisioninc.com**
**info@lavisioninc.com**

LaVision provides integrated imaging systems to scientific, industrial and education markets. LaVision has extensive experience in optical techniques such as 2-D, stereo and tomographic particle image velocimetry, gaseous and liquid laser induced fluorescence, shadography for multi-phase flows, digital image correlation for deformation/strain, high-speed and ultra-high-speed imaging, and intensified camera systems.

## Lockheed Martin Skunk Works® 502

**1011 Lockheed Way**
**Palmdale, CA 935997**
**www.lockheedmartin.com/us/aeronautics/skunkworks.html**
**david.g.welch@lmco.com**

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## MathWorks 621

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**www.mathworks.com**

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## Metacomp Technologies 610

**28632 Roadside Drive, Suite 255**
**Agoura Hills, CA 91301**
**www.metacomptech.com**
**info@metacomptech.com**

Metacomp Technologies

Metacomp Technologies develops and disseminates simulation software and services in multiple physics areas. ICMP (Integral Computational Multi-Physics) is our unified vision for Multi-Physics simulations which simplifies the complexities of the individual disciplines. ICMP provides a single environment for Mesh Generation, CFD and Structural Analyses, and Visualization of results.

## Micro Craft, Inc. 615

**207 Big Springs Ave.**
**Tullahoma, TN 37388**
**www.microcraft.aero**
**randy.hildreth@microcraft.aero**

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Micro Craft, Inc. is a 100% Employee Owned Small Business located in Tullahoma, Tennessee. We produce flight hardware for a wide variety of aircraft, wind tunnel models and space flight hardware. We possess excellent capabilities in design and test engineering services.

## NASA Aeronautics Research Directorate 716

**NASA Headquarters**
**300 E Street, SW**
**Washington, D.C. 20546**
**www.aeronautics.nasa.gov**

NASA

Research conducted by NASA's Aeronautics Research Mission Directorate has directly benefited today's air transportation system, aviation industry, and the passengers and businesses who rely on aviation every day. Our tools and technologies have already increased the capacity and improved the efficiency, safety, and environmental compatibility of the air transportation system. NASA continues to explore research and develop tools and technologies that can be integrated into even more advanced and efficient aircraft and airspace systems, including enabling game-changing concepts for the future.

## NASA's Space Technology Mission Directorate 704

**NASA Headquarters**
**300 E Street, SW**
**Washington, DC 20546**
**www.nasa.gov/spacetech**

NASA

Technology Drives Exploration. The nation's investments in space technology enable NASA to make a difference in the world around us. The Space Technology Mission Directorate (STMD) is responsible for developing the crosscutting, pioneering, new technologies and capabilities needed by the agency to achieve its current and future missions.

# Exhibitors

## National Academies of Sciences, Engineering, and Medicine — 415

**500 Fifth Street NW**
**Washington, DC 20001**
**www.nationalacademies.org/rap**
**jdellamo@nas.edu**

The National Academies of Sciences, Engineering, and Medicine conducts the NRC Research Associateship Programs that offer awards for postdoctoral, senior, and graduate research in US federal laboratories and affiliated institutions. Awards include competitive stipends, relocation, professional travel and a health insurance plan. Complete information and online applications are on the website.

## National Institute of Aerospace — 516

**100 Exploration Way**
**Hampton, VA 23666**
**www.NIAnet.org**
**sherwood@nianet.org**

The National Institute of Aerospace is a non-profit research and graduate education institute created in 2002 to conduct leading-edge aerospace and atmospheric research, develop new technologies for the nation and help inspire the next generation of scientists and engineers.

## National Reconnaissance Office (NRO) — 510

**14675 Lee Road**
**Chantilly, VA 21051**
**https://acq.westfields.net**
**dii@nro.mil**

NRO's Director's Innovation Initiative invests in advanced technologies, fosters innovation, and provides funding to improve our capabilities. It presents an opportunity for developers not traditionally associated with the NRO to participate in building the NRO of the 21st Century.

## NUMECA USA, Inc. — 708

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**San Francisco, CA 94109**
**www.numeca.com**
**contact@numeca-usa.com**

Based on the most advanced technology, NUMECA CFD software is known for its application-driven features and interface, optimal solutions, multi-physics models, high accuracy, speed and general user-friendliness. NUMECA solutions cover a wide range of aerospace flow analyses and are recognized by a large number of commercial and military groups.

## Office of Naval Research — 309

**875 North Randolph Street**
**Arlington, VA 22203**
**www.onr.navy.mil**
**anna.huff.ctr@navy.mil**

The Office of Naval Research's Naval Air Warfare and Weapons division supports the Navy's power projection needs, fostering the technology development of naval aircraft, structures, propulsion, autonomy, energetics, directed energy and electric weapons. Visit us at Booth #309.

## Orbital ATK — 315

**77 Raynor Avenue**
**Ronkonkoma, NY 11779**
**rich.perlman@orbitalatk.com**
**www.OrbitalATK.com**

Orbital ATK specializes in the design, build and delivery of space, defense and aviation-related systems for customers worldwide, both as a prime contractor and a supplier. We also offer a wide range of T&E services including flight and load simulation; structural and environmental testing; shock, vibration and thermal analysis; blast, ballistic and fragmentation analysis and customized services. www.OrbitalATK.com

## Photron — 611

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**www.photron.com**
**image@photron.com**

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## Pointwise, Inc. — 318

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**sales@pointwise.com**

Pointwise, Inc. is solving the top problems facing engineering analysts today: mesh generation for computational fluid dynamics. Manufacturing firms and research organizations use Pointwise's mesh generation software to seamlessly bridge the gap between CAD and computational fluid dynamics analysis. Find more information at pointwise.com.

# Exhibitors

## Presidio Components, Inc. 715

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San Diego, CA 92121
www.presideiocomponents.com
fred@presidiocomponents.com

US manufacturer of Space Qualified Ceramic Capacitors (QPL, NASA DWG, DSCC Approved Test Lab). Markets: Power Supplies SMD 0201-2225, SMPS Stacks to 180uF, High Voltage Radial Leads, Crystal Oscillators, RF/MW Wirebondable Single Layers, Bypass and Broadband Bypass, SMD Broadband DC Block, Lowest ESR Ultra-Porcelain for RF Power/Hi Q applications.

## SEDS@UCSD 706

9500 Gilman Dr.
La Jolla, CA 92093
seds@ucsd.edu
dnguyan6139@gmail.com

We are the Students for the Exploration and Development of Space here at UC San Diego. We are the first student organization to design, print, and test two 3D-Printed Rocket Engines!

## SG – Space & Ground Engineering Solutions 207

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www.sg-incorp.com
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SG Company provides integrated engineering solutions for air/space-based earth monitoring systems and develops special techniques for UAS (Unmanned Aerial Systems) earth observation applications in various disciplines.

## Smart Material Corporation 213

2170 Main Street, Suite 302
Sarasota, FL 34237
www.smart-material.com
info@smart-material.com

Smart Material Corp. manufactures and develops advanced piezoelectric composites and electronics for actuators, sensors, energy harvesting and ultrasound transducers, including the MFC (Macro Fiber Composite) used for De-Icing, Wing morphing, Rudder control, Vibration control, Energy Harvesting from Vibration, Structural Health Monitoring.

## SmartUQ 216

1245 E. Washington Ave
Suite 210
Madison, WI 53703
www.smartuq.com
contact@smartuq.com

SmartUQ software provides breakthrough analytics and uncertainty quantification solutions for simulation and testing. Using advanced statistics and stochastic methods, SmartUQ allows engineers to quickly analyze Big Data, understand the probabilities of all what-if scenarios, accelerate simulation cycles, easily calibrate models, and create innovative designs with greater confidence.

## Software Cradle Co., Ltd. 221

50 Chestnut Street
Suite A-214
Beavercreek, OH 45440
www.cradle-cfd.com
info@cradle-cfd.com

Software Cradle is a leading provider of general purpose Computational Fluid Dynamics (CFD) software including SC/Tetra (unstructured mesh), scSTREAM (Cartesian mesh), and HeatDesigner (Cartesian mesh for electronics). Since 1984, Cradle has established itself as a major innovator for advancing the role of simulation in engineering design.

## Tecplot, Inc 301

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## TEN TECH LLC 215

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Los Angeles, CA 90045
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TEN TECH LLC is an ITAR-registered company serving the A&D industry with high-end mechanical engineering design, test and analysis services with emphasis on thermal, shock and vibration. TEN TECH LLC also provides sales and support for the SIMULIA, CATIA and ENOVIA lines of 3DS product as well as the 3DEXPERIENCE Platform with A&D focus.

# Exhibitors

## Tetra Research Corporation 417

**420 Park Ave. West**
**Princeton, IL 61356**
**www.tetraresearch.com**
**rex@tetraresearch.com**

Tetra Research specializes in Loci/CHEM development and applications. Loci/CHEM is a unique CFD software tool used by NASA and industry partners for stage separation, solid motor ignition and other multi-disciplinary analyses. We provide support, customized development and training services to allow you to make the most productive use of Loci/CHEM.

## Tri Models Inc. 512

**5191 Oceanus Drive**
**Huntington Beach, CA 92649**
**www.trimodels.com**
**cathaide@trimodels.com**

Tri Models is the Premier supplier of Wind Tunnel Models & Ground Test hardware for the global aerospace community. We play a vital role in the development of new systems for the airframe companies. Whether you have a new program or are refining an existing vehicle, Tri Models can help.

## Triumph Aerospace Systems 616

**703 Middle Ground Boulevard**
**Newport News, VA 23606**
**www.triumphgroup.com/companies**
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**dbooth@triumphgroup.com**

Triumph Aerospace Systems is an industry leader in the development, engineering and manufacture of complex aerospace hardware, and prototype systems for force measurement devices, ground test and flight applications. We provide new balances, turn-key model positions systems, and calibrations to the wind tunnel industry.

## TSI, Inc. 705

**500 Cardigan Road**
**Shoreview, MN 55126**
**www.tsi.com**
**answers@tsi.com**

For over 50 years, TSI has been providing a complete line of fluid diagnostics systems for air/gas flow research including: Particle Image Velocimetry, TR-Volumetric PIV, Laser Doppler Velocimetry and Hot Wire Anemometry. These systems can be used for measuring supersonic to low speed flows, giving details of the fluid statistics.

## UCRI 204

**One Stetson Place**
**ML 0647**
**Cincinnati, OH 45221**
**www.ucri.org**
**connect@ucri.org**

UCRI is an independent not-for-profit 501(c)(3) organization which serves for the University of Cincinnati (UC). UCRI makes it easy for the industry partners to connect with UC on business ideas, research projects, resource needs and other industry essentials.

## University of Kansas 711

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**Overland Park, KS 66062**
**https://aeroshortcourses.ku.edu**
**gredlics@ku.edu**

The KU Aerospace Short Course Program is one of the most respected non-credit professional development programs in the world. Our outstanding instructors—drawn from industry, academia and government experts—translate theory into practical application, so you can return to work and solve real-world problems immediately.

# Exhibitors

## United Technologies Research Center (UTRC) 201

**4th Floor**
**Penrose Business Centre**
**Penrose Wharf, Cork Ireland**
**www.utrc.utc.com**

United Technologies Research Center

United Technologies Research Center delivers advanced technologies to the businesses of United Technologies Corp. (UTC) to improve the performance, energy efficiency and cost of UTC products and processes. UTRC also engages with UTC business units and external research organizations to expand the boundaries of science and technology through research and innovation, delivering technology options that meet and anticipate the needs of the marketplace. Founded in 1929, UTRC is headquartered in East Hartford, Connecticut. and has research and development subsidiaries established in Shanghai, China, and Cork, Ireland. UTRC's affiliate, United Technologies Research Center, Inc., has a research facility in Berkeley, California. Find out what it means to Be Curious at www.utrc.utc.com.

## XFlow CFD 219

**40 Chellis Street**
**White River Junction, VT 05001**
**www.xflowusa.com**
**info@xflowusa.com.**

XFlow

XFlow™ CFD is the next-generation, meshless CFD package for modeling external aerodynamics of fixed-wing and rotorcraft aircraft. XFlow supports complex motion of complicated moving parts to model dynamic effects of control surface motion in flight, high-lift (take-off and landing) configurations and/or separation of munitions or separable stores.

# SpaceOps 2016 Conference

May 16-20, 2016
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## Expanding the Space Community

Hosted in 2016 by the Korea Aerospace Research Institute (KARI) and the American Institute for Aeronautics and Astronautics (AIAA), SpaceOps is a biennial technical forum of the space operations community focused on state-of-the-art operations principles, methods and tools.

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- **Cross Support, Interoperability and Standards**
- **Human Systems and Operations**
- **Launcher, Rockets and Balloon Operations**
- **Emerging Space Operations in Asia and Developing Countries**

## Registration Opens 1 February 2016
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KARI Korea Aerospace Research Institute

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# General Information

## AIAA Registration Hours

AIAA Registration will be located on the second floor of the hotel in the Palm and Seaport Foyers

| | |
|---|---|
| **Sunday, 3 January** | **1500–1900 hrs** |
| **Monday, 4 January –Thursday, 7 January** | **0700–1730 hrs** |
| **Friday, 8 January** | **0700–1230 hrs** |

## Wi-Fi Internet Access On Site

AIAA is providing limited Wi-Fi service for attendees to use while on site. To keep this service available and optimized for all attendees, please do not download files larger than 2MB, create multiple sessions across multiple devices, or download multiple files in one session. If you receive an error message that an AIAA server is blocking your current IP address, please inform the AIAA registration desk.

**Network Name:** SCITECH2016

**Password:** aiaa2016

1. View Available Wireless Networks
2. Connect to "SCITECH2016" Network
3. Enter the Password aiaa2016
4. Open your Web Browser, begin surfing

For Assistance, please call our Meeting Room Internet Support at 619.796.5551.

## AIAA Livestream Channel

Visit livestream.com/aiaavideo/scitech2016 to view selected keynotes, plenaries, and Forum 360 sessions. Share the link with colleagues who couldn't attend the conference, so they can watch live or view later.

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## Social Media at #aiaaSciTech

Interested in participating in social media at #aiaaSciTech? Use the hashtag #aiaaSciTech and watch for your Tweets and Instagrams to be displayed at the conference.

There will again be a Twitter contest running throughout AIAA SciTech 2016. Meet your rivals and have fun networking with other science and engineering professionals at the official Tweet Up, which will be held at Redfield's Sports Bar inside the conference hotel at 5:00 p.m. on 6 January 2016.

Official Contest Rules: **www.aiaa-scitech.org/TwitterContest/**

## Conference Proceedings

Proceedings for the forum will be available online. The cost is included in the registration fee where indicated. Online proceedings will be available on Monday, 4 January.

### Instructions to Access Proceedings:

1. To view proceedings, visit www.aiaa.org >ARC>Meeting Papers.
   a. Log in with the link at the top right of the page.
   b. Select the appropriate conference from the list.
   c. Search for individual papers with the Quick Search toolbar in the upper-right corner of the page:
      i. By paper number: Click the Paper Number link, select the conference year, and enter the paper number.
      ii. Use the Search textbox to find papers by author, title, or keyword. The Advanced Search link provides additional search information and options.
2. All manuscript files submitted by four days prior to the conference are currently in the proceedings. Files submitted after that date, both original and revised manuscripts, will not be available until the final proceedings update, which may take up to 15 business days after the last day of the conference.
3. Direct any questions concerning access to proceedings and/or ARC to **arcsupport@aiaa.org**.

### Manuscript Revisions

5. Manuscript revision is open for all presenting authors from 0900 hrs Eastern Time, Monday, 4 January through 2000 hrs Eastern Time, Wednesday, 20 January. Revisions submitted during this period are limited to minor changes only (e.g., typos and the like). Changes to content are not permitted.
6. Revisions submitted for manuscripts already online **will not refresh until after the proceedings have been updated**, which may take up to 15 business days after the last day of the conference.

## Certificate of Attendance

Certificates of Attendance are available for attendees who request documentation at the forum itself. Beginning Wednesday, 6 January, you will be able to create and print your certificate at AIAA Registration. AIAA offers this service to better serve the needs of the professional community. Claims of hours or applicability toward professional education requirements are the responsibility of the participant.

# General Information

## Employment Opportunities

AIAA members can post and browse resumes, browse job listings, and access other online employment resources by visiting the AIAA Career Center at **careercenter.aiaa.org.**

## Membership

AIAA is your vital lifelong link to the collective creativity and brainpower of the aerospace profession and a champion for its achievements. Included in the nonmember full conference registration fee is a one-year AIAA membership. Students who are not yet members may apply their registration fee toward their first year's student member dues. (Membership is not included in discounted group-rate registration.)

AIAA FOUNDATION
*Advancing Aerospace*

## AIAA Foundation Celebrates 20 Years

The AIAA Foundation exists to inspire students by developing programs that will shape the next generation of aerospace professionals. As we celebrate our 20th anniversary, help us accomplish an amazing feat. Please consider donating $20 for the 20 years of leadership and resources that the AIAA Foundation has provided. With a goal of having 10,000 members each donate $20, the AIAA Foundation will raise $200,000.

Your generous gift will contribute to the wealth of resources that AIAA develops to support STEM education at every level. Our mission to promote education and recognize excellence in the aerospace community is funded by visionaries just like you. You can make a difference.

The AIAA Foundation has already accelerated the future of aerospace by:

- Funding more than 1,200 K–12 Classroom Grants, impacting over 120,000 precollege students
- Awarding aerospace scholarships to more than 1,300 undergraduate and graduate students
- Supporting more than 400 student conferences, engaging more than 13,000 students with practical, hands-on STEM-based projects
- Sponsoring design competitions that have generated more than 1,200 teams, engaging more than 14,000 students
- Inspiring more than 200 student branches, 8,000 student members, and 4,000 Educator Associates with resources to further their career path

To make a donation on site, please visit the AIAA Pavilion in the Exposition Hall, and be entered to win a 2-night complimentary stay at the Gaylord Texan during AIAA SciTech 2017.*

For more information about the AIAA Foundation and to make a donation online, please visit **www.aiaafoundation.org.**

*****Please note: a donation is not necessary to be entered in the raffle.*

## Young Professional Guide for Gaining Management Support

Young professionals have the unique opportunity to meet and learn from some of the most important people in the business by attending conferences and participating in AIAA activities. A detailed online guide, published by the AIAA Young Professional Committee, is available to help you gain support and financial backing from your company. The guide explains the benefits of participation, offers recommendations, and provides an example letter for seeking management support and funding, and shows you how to get the most out of your participation. The online guide can be found on the AIAA website at **www.aiaa.org/YPGuide**.

## Badge Policy

AIAA forum badges are provided to those attendees who have paid for a registration to the event (and must be worn at all times to participate in all forum activities). Badges are not provided at the registration desk for committee meetings. To obtain a SciTech badge, you must register for the forum.

## Nondiscriminatory Practices

AIAA accepts registrations irrespective of race, creed, sex, color, physical handicap, and national or ethnic origin.

## Restrictions

Photos, video, or audio recording of sessions or exhibits, as well as the unauthorized sale of AIAA-copyrighted material, is prohibited.

# General Information

## Author and Session Chair Information

### Speakers' Briefings in Session Rooms

Authors who are presenting papers will meet with session chairs and co-chairs in their session rooms for a short 30-minute briefing on the day of their sessions to exchange bios and review final details prior to the session. Please attend on the day of your session(s). Laptops preloaded with the Speaker Briefing preparation slides will be provided in each session room. Speaker's Briefing schedule is as follows:

**Monday, 4 January–Friday, 8 January: 0730 hrs**

### Speakers' Practice Room

Speakers who wish to practice their presentations may do so in the Solana Beach B room located on the third level of the Seaport Tower. A sign-up sheet will be posted on the door. In consideration of others, please limit practice time to 30-minute increments.

### Session Chair Reports

All session chairs are asked to complete a session chair report to evaluate their session for future planning. AIAA has partnered with Canvas Solutions to provide an electronic Session Chair Report form. You can download the FREE mobile app in your App Store, AppWorld, or Marketplace by searching for "Canvas Solutions, Inc." The mobile app is free, so please be sure to download it. Detailed instructions will be provided in the session rooms. If you do not have a tablet or a smartphone, simply use the report form as a guide and enter your session chair report information at the session chair reporting computer station located on site near the AIAA registration area. Report data will be collected and used for future planning purposes, including session topics and room allocations. Please submit your session chair report **electronically** by Friday, 8 January.

### Audiovisual

Each session room will be preset with the following: one LCD projector, one screen, one microphone and sound system (if necessitated by room size), and one laser pointer. **Laptop computers will also be provided.** You may also use your own computer. Any additional audiovisual equipment requested on site will be at cost to the presenter. Please note that AIAA does not provide security in the session rooms and recommends that items of value not be left unattended.

### "No Paper, No Podium" and "No Podium, No Paper" Policy

If a written paper is not submitted by the final manuscript deadline, authors will not be permitted to present the paper at the forum. Also, if the paper is not presented at the forum, it will be withdrawn from the proceedings. It is the responsibility of those authors whose papers or presentations are accepted to ensure that a representative attends the conference to present the paper. These policies are intended to improve the quality of the program for attendees.

### Journal Publication

AIAA has prior publication rights to any paper presented at its conferences. Authors who are seeking the opportunity for peer-reviewed publication are encouraged to submit their papers for consideration by one of the Institute's archival journals: *AIAA Journal; Journal of Aircraft; Journal of Air Transportation; Journal of Guidance, Control, and Dynamics; Journal of Propulsion and Power; Journal of Spacecraft and Rockets; Journal of Thermophysics and Heat Transfer;* or *Journal of Aerospace Information Systems (formerly Journal of Aerospace Computing, Information, and Communication).* You may now submit your paper online at **http://mc.manuscriptcentral.com/aiaa**

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# Committee Meetings and Events

| Time | Title | Location |
|---|---|---|
| | **Sunday, 3 January 2016** | |
| 1200-1700 | **TAC TC/PC Chair Training** | Torrey Hills AB |
| 1300-1700 | **TAC Director/Deputy Director Training** | Hillcrest A |
| 1430-1500 | **APATC Liaisons Subcommittee** | Golden Hill A |
| 1430-1600 | **General Standards and Architecture Tutorial** | Hillcrest BC |
| 1500-1600 | **APATC Education Subcommittee** | Golden Hill A |
| 1500-1600 | **APATC Honors & Awards Subcommittee** | Gaslamp A |
| 1500-1600 | **APATC Membership & Nominations Subcommittee** | Gaslamp B |
| 1500-1600 | **APATC Planning Subcommittee** | Cortez Hill A |
| 1500-1600 | **APATC Publicity & Publications Subcommittee** | Cortez Hill B |
| 1530-1700 | **Student / Young Professional Networking** | Mission Beach A |
| 1600-1700 | **APATC Steering Subcommittee** | Gaslamp A |
| 1600-1700 | **FDTC Algorithm Development (High Order Methods)** | Golden Hill A |
| 1600-1730 | **Structural Dynamics of Rocket Engines Tutorial** | Old Town AB |
| 1700-1800 | **GTTC Steering Subcommittee** | Gaslamp CD |
| 1700-2000 | **Applied Aerodynamics TC** | Torrey Hills AB |
| 1715-1815 | **FDTC Large Eddy Simulation DG** | Golden Hill A |
| 1800-1900 | **GTTC Introduction/Overview** | Gaslamp CD |
| 1800-2030 | **Structures TC** | Regatta AB |
| 1800-2200 | **GNCTC Graduate Student Paper Competition** | Balboa A |
| 1800-2200 | **Atmospheric Flight Mechanics TC** | Hillcrest B-D |
| 1830-2000 | **FDTC Steering Committee** | Golden Hill A |
| 1900-2000 | **GTTC Publications Subcommittee** | Gaslamp CD |
| 1900-2100 | **FDTC Transition DG** | Old Town AB |
| 1900-2100 | **FDTC Low Re Number DG - Preparation Meeting** | La Jolla AB |
| 1900-2100 | **TAC Propulsion and Energy Group Meeting** | Hillcrest A |
| 1900-2100 | **TAC Aircraft and Atmospheric Systems Group Meeting** | Solana Beach A |
| 1900-2100 | **TAC Information Systems Group Meeting** | Gaslamp A |
| 1900-2100 | **TAC Aerospace Design and Structures Group Meeting** | Gaslamp B |
| 1900-2100 | **TAC Engineering and Technology Management Group Meeting** | Cortez Hill A |
| 1900-2100 | **TAC Space and Missiles Group Meeting** | Cortez Hill B |
| 1900-2200 | **TAC Program Committees Group Meeting** | Balboa C |
| 2000-2100 | **GTTC Conferences Subcommittee** | Gaslamp CD |
| 2000-2100 | **AMTTC Conferences Subcommittee** | Torrey Hills AB |
| | **Monday, 4 January 2016** | |
| 0800-0900 | **HSABPTC Steering Committee** | Conference Parlor 705 |
| 0800-1600 | **GTTC Internal Balance WG** | Cityview A |
| 0900-1000 | **ABPTCs Steering Committee** | Conference Parlor 705 |
| 0900-1100 | **Journals Subcommittee** | Conference Parlor 724 |
| 1000-1100 | **HSABPTC Meeting** | Mission Beach A |
| 1000-1100 | **ABPSITC Meeting** | Cityview B |
| 1000-1100 | **GTETC Meeting** | Conference Parlor 705 |
| 1100-1200 | **Books Subcommittee** | Conference Parlor 724 |
| 1100-1200 | **PAW Workshop** | Mission Beach A |

# Committee Meetings and Events

| Time | Title | Location |
|---|---|---|
| | **Monday, 4 January 2016 (continued)** | |
| 1100-1300 | **Solid Rockets TC** | Cityview B |
| 1200-1300 | **ABPTCs Conference Subcommittee** | Conference Parlor 705 |
| 1200-1400 | **Aircraft Electric Propulsion Path Forward** | Solana Beach A |
| 1230-1400 | **GNCTC Undergraduate Conference Experience in GNC** | Conference Parlor 717 |
| 1300-1500 | **Education Series Editorial Advisory Board** | Conference Parlor 724 |
| 1300-1500 | **SEC Reorganization TG** | Mission Beach A |
| 1400-1500 | **ABPTCs Honors & Awards Subcommittee** | Conference Parlor 705 |
| 1500-1600 | **ABPTCs Education Subcommittee** | Conference Parlor 705 |
| 1500-1600 | **FDTC Free Shear and Mixing Layer Control** | Mission Beach A |
| 1500-1700 | **Progress Series Editorial Advisory Board** | Conference Parlor 706 |
| 1500-1700 | **Relevancy Working Group** | Conference Parlor 733 |
| 1730-1830 | **The Future of AIAA: Why Governance Matters to You** | Seaport ABCDE |
| 1600-1700 | **ABPTCs Communications Subcommittee** | Conference Parlor 705 |
| 1630-1730 | **FDTC Modal Decomposition DG** | Hillcrest D |
| 1700-1800 | **ABPTCs Membership Subcommittee** | Conference Parlor 705 |
| 1700-1800 | **APATC Missile & Projectile Aeroprediction DG** | Cityview A |
| 1700-1800 | **AMTTC New Member Orientation** | Conference Parlor 706 |
| 1700-1830 | **CASE 2016 Planning Meeting** | La Jolla B |
| 1700-1830 | **FDTC Flow Control and Fluid App SC** | Conference Parlor 734 |
| 1700-1900 | **ABPTCs WGs (TC Meeting Prep)** | Conference Parlor 733 |
| 1730-1830 | **FDTC Turbulence Model Benchmarking DG** | Harbor D |
| 1730-1930 | **Aerospace @ Illinois Alumni Reception** | Regatta A |
| 1730-2000 | **SCSTC Handbook on Testing Large Structures** | Conference Parlor 724 |
| 1730-2030 | **Flight Testing TC** | Conference Parlor 717 |
| 1800-1900 | **GTTC Awards Subcommittee** | Coronado B |
| 1800-2000 | **AMTTC Awards Subcommittee** | Conference Parlor 706 |
| 1800-2100 | **Society and Aerospace Technology TC** | Cityview B |
| 1830-1915 | **2016 Associate Fellows Reception** | Seaport Foyer Terrace |
| 1830-1930 | **MATTC ICME Prize Planning** | Torrey Hills AB |
| 1830-2100 | **CASE 2016 Applied Complexity Workshop Planning** | La Jolla B |
| 1830-2130 | **Energy Optimized Aircraft and Equipment Systems PC** | Harbor D |
| 1900-2000 | **GTTC Education and Student Activities Subcommittee** | Regatta BC |
| 1900-2030 | **APATC Validation of Numerical Models DG** | Cityview A |
| 1900-2100 | **ABPTCs Meeting** | Cortez Hill AB |
| 1900-2100 | **FDTC CFD Subcommittee** | America's Cup A |
| 1900-2100 | **FDTC Fundamentals Subcommittee** | America's Cup B |
| 1900-2100 | **Adaptive Structures TC** | Coronado D |
| 1900-2130 | **Propellants and Combustion TC** | Coronado E |
| 1900-2200 | **Aircraft Design TC** | Coronado A |
| 1900-2200 | **Career and Professional Development Committee** | Conference Parlor 733 |
| 1900-2200 | **TAC Aerospace Sciences Group Meeting** | Hillcrest AB |
| 1900-2200 | **MVCETC Meshing Subcommittee** | Cortez Hill C |
| 1900-2200 | **Terrestrial Energy Systems TC** | Coronado B |

# Committee Meetings and Events

| Time | Title | Location |
|---|---|---|
| | **Monday, 4 January 2016 (continued)** | |
| 1900-2200 | **Small Satellite TC** | Mission Beach A |
| 1930-2130 | **MATTC ICME Subcommittee** | Torrey Hills AB |
| 1930-2230 | **2016 Associate Fellows Ceremony and Dinner - Ticket Required** | Seaport FG |
| | **Tuesday, 5 January 2016** | |
| 0800-0900 | **Audit Committee** | Conference Parlor 705 |
| 0800-1000 | **2017 Associate Fellows Committee** | Cityview AB |
| 0800-1000 | **Journal of Guidance, Control and Dynamics Editorial Advisory Board** | Mission Beach A |
| 0800-1000 | **International Activities Committee** | Torrey Hills AB |
| 0900-1000 | **Publications Ethical Standards Subcommittee** | Conference Parlor 724 |
| 0900-1000 | **RAC III Meeting - By Invite Only** | Conference Parlor 705 |
| 0900-1100 | **ISC Awards Brunch - By Invite Only** | Seaport H |
| 0900-1100 | **RAC I** | Conference Parlor 706 |
| 0915-1545 | **Career Workshop: Communications and Connections for Your Career** | Vista AB |
| 0900-1700 | **GTTC Dual Flow Reference Nozzle WG** | Conference Parlor 717 |
| 1000-1100 | **Publications Awards Subcommittee** | Conference Parlor 724 |
| 1000-1200 | **Journal of Propulsion and Power Editorial Advisory Board** | Mission Beach A |
| 1000-1200 | **TAC New Initiatives Subcommittee** | Cityview AB |
| 1030-1130 | **RAC IV Meeting - By Invite Only** | Conference Parlor 705 |
| 1030-1200 | **Finance Committee** | Torrey Hills AB |
| 1100-1200 | **Publications Review Subcommittee** | Conference Parlor 724 |
| 1200-1730 | **Region and Section Activities Committee** | Mission Beach A |
| 1230-1630 | **GTTC Model Attitude & Deformation WG** | Conference Parlor 734 |
| 1300-1500 | **Student Activities Committee** | Cityview AB |
| 1300-1500 | **SEC/CoSs Joint Meeting** | Torrey Hills AB |
| 1400-1500 | **HyTASP PC Steering Committee** | Conference Parlor 705 |
| 1500-1600 | **TPTC Best Paper Subcommittee** | Conference Parlor 705 |
| 1500-1700 | **LM Aeronautics Meeting** | Torrey Hills AB |
| 1500-1800 | **Public Policy Committee Meeting** | Cityview AB |
| 1600-1700 | **TPTC Awards Subcommittee** | Conference Parlor 705 |
| 1600-1700 | **TPTC Education Subcommittee** | Conference Parlor 706 |
| 1600-1800 | **Journal of Spacecraft and Rockets Editorial Advisory Board** | Conference Parlor 733 |
| 1630-1730 | **Membership Matters: How Far Will You Go?** | Regatta B |
| 1630-1730 | **GEPC Conference Subcommittee** | Conference Parlor 724 |
| 1630-1830 | **Journal of Thermophysics and Heat Transfer Editorial Advisory Board** | Conference Parlor 734 |
| 1700-1800 | **TPTC Publicity Subcommittee** | Conference Parlor 705 |
| 1700-1800 | **TPTC Conferences Subcommittee** | Conference Parlor 706 |
| 1700-1900 | **Computational Fluid Dynamics Committee on Standards (CFD CoS)** | Torrey Hills AB |
| 1730-1830 | **GEPC Leadership Team** | Conference Parlor 724 |
| 1800-1900 | **FDTC Future of Fluids Subcommittee** | Conference Parlor 706 |
| 1800-1900 | **APATC DG** | Hillcrest A |
| 1800-1900 | **Liquid Propulsion TC** | Mission Beach A |
| 1800-1900 | **TPTC Nominations Subcommittee** | Conference Parlor 705 |

# Committee Meetings and Events

| Time | Title | Location |
|---|---|---|
| | **Tuesday, 5 January 2016 (continued)** | |
| 1800-1900 | **TPTC Publications Subcommittee** | Conference Parlor 717 |
| 1800-2100 | **Unmanned Systems PC** | America's Cup D |
| 1830-2100 | **Publications Committee** | America's Cup AB |
| 1830-2130 | **Intelligent Systems TC** | Coronado E |
| 1830-2130 | **Transformational Flight PC** | Balboa AB |
| 1830-2130 | **ASME Wind Energy TC** | Cityview AB |
| 1830-2230 | **Membership Committee** | Conference Parlor 734 |
| 1900-2100 | **Plasmadynamics and Lasers TC** | Torrey Hills AB |
| 1900-2200 | **Aerospace Department Chair Association Meeting** | Harbor B |
| 1900-2200 | **Fluid Dynamics TC** | Cortez Hill AB |
| 1900-2200 | **Aeroacoustics TC** | Mission Beach A |
| 1900-2200 | **Materials TC** | Coronado A |
| 1900-2200 | **Pressure Gain Combustion PC** | Hillcrest A |
| 1900-2200 | **Sensor Systems and Information Fusion TC** | Conference Parlor 706 |
| 1900-2200 | **Thermophysics TC** | Coronado D |
| 1900-2300 | **Aerodynamics Measurement Technology TC** | Coronado B |
| 1930-2130 | **HyTASP PC** | Harbor F |
| 1930-2230 | **Structures TC** | Harbor H |
| | **Wednesday, 6 January 2016** | |
| 0800-1200 | **GTTC Dual Flow Reference Nozzle WG** | Conference Parlor 706 |
| 0800-1200 | **GTTC Future of Ground Test WG** | Conference Parlor 724 |
| 0800-1700 | **Systems Engineering TC** | Mission Beach A |
| 0900-1100 | **Standards Executive Council (SEC) Meeting** | Conference Parlor 705 |
| 0900-1200 | **Cross Check Workshop and Journal Editors in Chief** | Conference Parlor 733 |
| 0900-1200 | **DETC Subcommittee Meeting** | Conference Parlor 717 |
| 0930-1200 | **Foundation Board of Trustees** | Cityview A |
| 0930-1200 | **Region and Section Activities Committee** | Torrey Hills AB |
| 0930-1200 | **TAC Executive Board** | Cityview B |
| 1200-1700 | **Technical Activities Committee** | Seaport H |
| 1300-1600 | **DETC Subcommittee Meeting** | Conference Parlor 717 |
| 1300-1600 | **Corporate Member Committee Meeting** | Torrey Hills AB |
| 1300-1700 | **GTTC Uncertainty Analysis WG** | Conference Parlor 705 |
| 1330-1500 | **RAC II Meeting** | Conference Parlor 706 |
| 1330-1630 | **Honors and Awards Committee** | Cityview B |
| 1330-1630 | **Institute Development Committee** | Cityview A |
| 1400-1700 | **Aerospace Cyber Security WG** | Conference Parlor 724 |
| 1500-1700 | **Education Activities Committee (EAC)** | Conference Parlor 706 |
| 1700-1800 | **Short Course Brainstorming Session** | Torrey Hills AB |
| 1700-1800 | **AMTTC Nominations Subcommittee** | Conference Parlor 706 |
| 1700-1900 | **Emerging Technologies Committee** | Conference Parlor 724 |
| 1700-2000 | **Digital Avionics TC** | Conference Parlor 705 |
| 1730-1830 | **FDTC Low Re DG** | Cityview B |
| 1730-1830 | **FDTC Free Shear and Mixing Layer Control** | Cityview A |

# Committee Meetings and Events

| Time | Title | Location |
|---|---|---|
| | **Wednesday, 6 January 2016 (continued)** | |
| 1730-2000 | **Green Engineering PC** | Old Town A |
| 1800-1900 | **GTTC New Member and Mentors Meeting** | Conference Parlor 706 |
| 1800-1930 | **FDTC Non-Equilibrium DG** | Coronado E |
| 1800-2000 | **APATC Rotorcraft Simulations & Performance Predictions DG** | Coronado D |
| 1800-2100 | **History TC** | Mission Beach A |
| 1800-2100 | **V/STOL Aircraft Systems TC** | Ocean Beach |
| 1800-2100 | **Design Engineering TC** | Conference Parlor 717 |
| 1800-2200 | **Guidance, Navigation and Control TC** | Torrey Hills AB |
| 1800-2200 | **Spacecraft Structures TC** | Harbor H |
| 1830-1930 | **ASME Structures and Materials TC** | Cityview A |
| 1830-2000 | **Crawford Slip Method Workshop on Networking** | Harbor A |
| 1830-2030 | **AMTTC Update Presentation/Student Event** | Seaport H |
| 1830-2030 | **Journal of Aircraft Editorial Advisory Board** | America's Cup CD |
| 1830-2030 | **Publications Book Authors Appreciation Reception** | Bankers Hill |
| 1830-2030 | **Aurora Flight Sciences** | Harbor C |
| 1830-2130 | **Multidisciplinary Design Optimization TC** | Harbor F |
| 1830-2130 | **Survivability TC** | Cityview B |
| 1830-2200 | **Software TC** | Solana Beach A |
| 1900-2000 | **FDTC Flow Control on Unmanned Aircraft** | Balboa C |
| 1900-2000 | **FDTC Solver Technology for Turbulent Flows** | La Jolla AB |
| 1900-2100 | **Plasma Aerodynamics DG** | Harbor D |
| 1900-2200 | **Meshing, Visualization and Computational Environments TC** | Coronado A |
| 1900-2200 | **Non-Deterministic Approaches TC** | Coronado B |
| 1900-2200 | **Structural Dynamics TC** | Harbor E |
| 1930-2100 | **Academic Affairs Committee Meeting** | Cityview A |
| 2000-2100 | **FDTC High Speed Flow Control** | La Jolla AB |
| | **Thursday, 7 January 2016** | |
| 0800-1000 | **AIAA Journal Editorial Advisory Board** | Cityview AB |
| 0800-1200 | **GTTC Flow Quality WG** | Mission Beach A |
| 0900-1200 | **Board of Directors** | Torrey Hills AB |
| 1000-1100 | **SciTech 2017 Technical Program Committee** | Cityview AB |
| 1230-1400 | **AIAA Ethics Committee** | Torrey Hills AB |
| 1330-1730 | **Governance Retreat I - By Invite Only** | Cityview AB |
| 1400-1600 | **GTTC Statiscally Defensible Test Methods Focus Group** | Mission Beach A |
| 1730-1830 | **APATC Low Boom DG** | Mission Beach A |
| 1730-2000 | **SCSTC High Strain Composites Subcommittee** | Harbor G |
| 1730-2030 | **Ground Testing TC** | Torrey Hills AB |
| 1830-2130 | **Modeling and Simulation TC** | Mission Beach A |
| | **Friday, 8 January 2016** | |
| 0800-1200 | **Governance Retreat II - By Invite Only** | Cityview AB |
| 0800-1700 | **GTTC Industry WG** | Torrey Hills A |

# Sessions at a Glance

| Abbreviation | Title | Date | Start Time | End Time | Location |
|---|---|---|---|---|---|
| | **Aeroacoustics** | | | | |
| 5-AA-1 | **Aeroacoustics - Jet Noise I** | 4-Jan | 0900 hrs | 1230 hrs | Nautical |
| 58-AA-2 | **Computational Aeroacoustics I** | 4-Jan | 1400 hrs | 1730 hrs | Nautical |
| 115-AA-3 | **Aeroacoustics - Jet Noise II** | 5-Jan | 0900 hrs | 1230 hrs | Nautical |
| 167-AA-4 | **Computational Aeroacoustics II** | 5-Jan | 1400 hrs | 1730 hrs | Nautical |
| 221-AA-5 | **Aeroacoustics - Advanced Measurement and Experiment** | 6-Jan | 0900 hrs | 1230 hrs | Nautical |
| 272-AA-6 | **Aeroacoustics - Fan, Rotor, and Airframe Noise** | 6-Jan | 1400 hrs | 1730 hrs | Nautical |
| | **Air Breathing Propulsion Systems Integration** | | | | |
| 6-ABPSI-1/GEPC-1 | **NASA ERA Systems Integration I** | 4-Jan | 0900 hrs | 1230 hrs | Golden Hill B |
| 59-ABPSI-2/GEPC-2 | **NASA ERA Systems Integration II** | 4-Jan | 1400 hrs | 1730 hrs | Golden Hill B |
| 116-ABPSI-3 | **Inlets** | 5-Jan | 0900 hrs | 1230 hrs | Golden Hill B |
| 168-ABPSI-4 | **Propulsion Integration** | 5-Jan | 1400 hrs | 1730 hrs | Golden Hill B |
| 222-ABPSI-5 | **High Speed Propulsion Integration** | 6-Jan | 0900 hrs | 1230 hrs | Hillcrest D |
| | **Aircraft Design** | | | | |
| 117-ACD-1 | **Aircraft Design Issues I** | 5-Jan | 0900 hrs | 1230 hrs | Cortez Hill A |
| 169-ACD-2 | **Aircraft Design Issues II** | 5-Jan | 1400 hrs | 1730 hrs | Cortez Hill A |
| 170-ACD-3 | **Aircraft Wing Design** | 5-Jan | 1400 hrs | 1730 hrs | Bankers Hill |
| 223-ACD-4 | **Electric Aircraft Design** | 6-Jan | 0900 hrs | 1230 hrs | Bankers Hill |
| 224-ACD-5 | **Transport Aircraft Design I** | 6-Jan | 0900 hrs | 1230 hrs | Cortez Hill A |
| 273-ACD-6 | **Aircraft Design Tools** | 6-Jan | 1400 hrs | 1730 hrs | Bankers Hill |
| 274-ACD-7 | **Transport Aircraft Design II** | 6-Jan | 1400 hrs | 1730 hrs | Cortez Hill A |
| 325-ACD-8 | **Unmanned Aerial Vehicle Design** | 7-Jan | 0900 hrs | 1230 hrs | Cortez Hill A |
| 326-ACD-9 | **Conceptual Aircraft Design Working Group 21, CADWG** | 7-Jan | 0900 hrs | 1200 hrs | Hillcrest D |
| 374-ACD-11 | **Micro Air Vehicle Design** | 7-Jan | 1400 hrs | 1730 hrs | Cortez Hill A |
| 428-ACD-13 | **Aircraft Design Optimization** | 8-Jan | 0900 hrs | 1230 hrs | Bankers Hill |
| | **Atmospheric Flight Mechanics** | | | | |
| 7-AFM-1 | **Biometric Flight Mechanics** | 4-Jan | 0900 hrs | 1230 hrs | Cortez Hill A |
| 8-AFM-2 | **Atmospheric Entry, Hypersonic Flight and Aeroassist Technology I** | 4-Jan | 0900 hrs | 1230 hrs | Cortez Hill B |
| 60-AFM-3 | **Special Session: Flight Testing in Education** | 4-Jan | 1400 hrs | 1730 hrs | Bankers Hill |
| 61-AFM-4 | **Atmospheric Entry, Hypersonic Flight and Aeroassist Technology II** | 4-Jan | 1400 hrs | 1730 hrs | Cortez Hill B |
| 118-AFM-5 | **Launch Vehicle, Missile, and Projectile Flight Mechanics I** | 5-Jan | 0900 hrs | 1230 hrs | Cortez Hill B |
| 171-AFM-6 | **Launch Vehicle, Missile, and Projectile Flight Mechanics II** | 5-Jan | 1400 hrs | 1730 hrs | Cortez Hill B |
| 225-AFM-7 | **Aircraft Flight Dynamics, Handling Qualities, and Performance I** | 6-Jan | 0900 hrs | 1230 hrs | Harbor A |
| 226-AFM-8 | **Special Session: LOC-5: Aircraft Loss of Control (LOC) Modeling Methods** | 6-Jan | 0900 hrs | 1230 hrs | Coronado B |
| 275-AFM-9 | **Aircraft Flight Dynamics, Handling Qualities, and Performance II** | 6-Jan | 1400 hrs | 1730 hrs | Harbor A |
| 327-AFM-10 | **Small/Mini/Micro Aerial Vehicles** | 7-Jan | 0900 hrs | 1230 hrs | Hillcrest B |
| 328-AFM-11 | **Aerodynamic Prediction Methods, Aircraft Flight Dynamics, Handling Qualities, and Performance** | 7-Jan | 0900 hrs | 1230 hrs | Harbor A |
| 375-AFM-12 | **Special Session: Realizing Performance Adaptive Aeroelastic Wing: Progress and Challenges** | 7-Jan | 1400 hrs | 1730 hrs | Coronado D |
| 376-AFM-13 | **Flight Test and System Identification I** | 7-Jan | 1400 hrs | 1730 hrs | Harbor A |
| 429-AFM-14 | **Aeroserovelastic (ASE) Control, Modeling, Simulation, and Optimization** | 8-Jan | 0900 hrs | 1230 hrs | Cortez Hill A |
| 430-AFM-15 | **Flight Test and System Identification II** | 8-Jan | 0900 hrs | 1230 hrs | Harbor A |

# Sessions at a Glance

| Abbreviation | Title | Date | Start Time | End Time | Location |
|---|---|---|---|---|---|
| | **Aerodynamic Measurement Technology** | | | | |
| 9-AMT-1 | **Velocimetry I** | 4-Jan | 0900 hrs | 1230 hrs | Balboa B |
| 62-AMT-2 | **Spectroscopy and Combustion Applications** | 4-Jan | 1400 hrs | 1730 hrs | Balboa B |
| 172-AMT-4 | **Velocimetry II** | 5-Jan | 1400 hrs | 1730 hrs | Harbor D |
| 227-AMT-5 | **Tomographic, Holographic and Other Volumetric Measurements** | 6-Jan | 0900 hrs | 1230 hrs | Harbor D |
| 276-AMT-6/PC-11/ PDL-8 | **Special Walter Lempert Memorial Session II (Invited)** | 6-Jan | 1400 hrs | 1730 hrs | Harbor D |
| 329-AMT-7 | **Error Sources and Calibration of Instruments** | 7-Jan | 0900 hrs | 1230 hrs | Harbor D |
| 377-AMT-8 | **High Speed Facility Measurements** | 7-Jan | 1400 hrs | 1730 hrs | Harbor D |
| 431-AMT-9 | **Surface Pressure and Skin Friction Measurements** | 8-Jan | 0900 hrs | 1230 hrs | Harbor D |
| 10-AMT-10/SD-15 | **Advances in Fluid-Structural Interaction Experimentation** | 4-Jan | 0900 hrs | 1230 hrs | Coronado D |
| | **Applied Aerodynamics** | | | | |
| 11-APA-2 | **Special Session: Simulation of Rotor in Hover I** | 4-Jan | 0900 hrs | 1230 hrs | Coronado E |
| 12-APA-3 | **Aerodynamic Testing: Flight and Large Scale** | 4-Jan | 0900 hrs | 1230 hrs | America's Cup C |
| 13-APA-4 | **Transonic & Supersonic Aerodynamics** | 4-Jan | 0900 hrs | 1230 hrs | America's Cup D |
| 63-APA-6/FD-7 | **Special Session: Advances in Fundamental Unsteady Low Reynolds Number Flows AVT-202** | 4-Jan | 1400 hrs | 1730 hrs | Coronado D |
| 64-APA-7 | **Aerodynamic Design: Analysis, Methodologies, and Optimization Techniques I** | 4-Jan | 1400 hrs | 1730 hrs | America's Cup B |
| 65-APA-8 | **Special Session: Simulation of Rotor in Hover II** | 4-Jan | 1400 hrs | 1730 hrs | Coronado E |
| 66-APA-9 | **High Angle of Attack and High Lift Aerodynamics** | 4-Jan | 1400 hrs | 1730 hrs | America's Cup C |
| 67-APA-10 | **Test and Prediction Techniques for High-Speed Flows** | 4-Jan | 1400 hrs | 1730 hrs | America's Cup D |
| 119-APA-11 | **Special Session: Space Launch System (SLS) Induced Environments I** | 5-Jan | 0900 hrs | 1230 hrs | Coronado D |
| 120-APA-12 | **Applied CFD & Numerical Correlations with Experimental Data I** | 5-Jan | 0900 hrs | 1230 hrs | America's Cup B |
| 121-APA-13 | **Aerodynamic Design: Analysis, Methodologies, and Optimization Techniques II** | 5-Jan | 0900 hrs | 1230 hrs | America's Cup C |
| 122-APA-14 | **Special Session: CREATE-AV HPC Multiphysics Applications of Full-Up Air Vehicles I** | 5-Jan | 0900 hrs | 1230 hrs | Coronado E |
| 123-APA-15 | **Flow Control Applications & Demonstrations I** | 5-Jan | 0900 hrs | 1230 hrs | America's Cup D |
| 173-APA-16 | **Special Session: Space Launch System (SLS) Induced Environments II** | 5-Jan | 1400 hrs | 1730 hrs | Coronado D |
| 174-APA-17 | **Applied CFD & Numerical Correlations with Experimental Data II** | 5-Jan | 1400 hrs | 1730 hrs | America's Cup B |
| 175-APA-18 | **Aerodynamic Design: Analysis, Methodologies, and Optimization Techniques III** | 5-Jan | 1400 hrs | 1730 hrs | America's Cup C |
| 176-APA-20 | **Propeller/Rotorcraft/Wind Turbine Aerodynamics I** | 5-Jan | 1400 hrs | 1730 hrs | Americas' Cup D |
| 228-APA-22 | **Special Session: CREATE-AV HPC Multiphysics Applications of Full-Up Air Vehicles II** | 6-Jan | 0900 hrs | 1230 hrs | Coronado E |

# Sessions at a Glance

| Abbreviation | Title | Date | Start Time | End Time | Location |
|---|---|---|---|---|---|
| | **Applied Aerodynamics (continued)** | | | | |
| 229-APA-23/FD-27 | **Special Session: NASA's Revolutionary Computational Aerosciences I** | 6-Jan | 0900 hrs | 1230 hrs | Coronado D |
| 230-APA-24 | **Low Speed, Low Reynolds Number Aerodynamics** | 6-Jan | 0900 hrs | 1230 hrs | America's Cup B |
| 231-APA-25 | **Aerodynamic Testing: Wind-Tunnel I** | 6-Jan | 0900 hrs | 1230 hrs | America's Cup C |
| 232-APA-26 | **Unsteady Aerodynamics I** | 6-Jan | 0900 hrs | 1230 hrs | America's Cup D |
| 277-APA-27 | **Special Session: Aerodynamic Design Optimization Benchmark Problems I** | 6-Jan | 1400 hrs | 1730 hrs | Coronado D |
| 278-APA-28 | **Special Session: CREATE-AV HPC Multiphysics Applications of Full-Up Air Vehicles III** | 6-Jan | 1400 hrs | 1730 hrs | Coronado E |
| 279-APA-29 | **Flow Control Applications & Demonstrations II** | 6-Jan | 1400 hrs | 1730 hrs | America's Cup C |
| 280-APA-30 | **Unsteady Aerodynamics II** | 6-Jan | 1400 hrs | 1730 hrs | America's Cup D |
| 330-APA-32 | **Special Session: Aerodynamic Design Optimization Benchmark Problems II** | 7-Jan | 0900 hrs | 1230 hrs | Coronado D |
| 331-APA-33 | **Applied CFD & Numerical Correlations with Experimental Data III** | 7-Jan | 0900 hrs | 1230 hrs | America's Cup D |
| 332-APA-34 | **Aerodynamic-Structural Dynamics Interactions I** | 7-Jan | 0900 hrs | 1230 hrs | America's Cup B |
| 333-APA-35/FD-41 | **Special Session: NASA's Revolutionary Computational Aerosciences II** | 7-Jan | 0900 hrs | 1230 hrs | Coronado E |
| 334-APA-36 | **Airfoil/Wing/Configuration Aerodynamics I** | 7-Jan | 0900 hrs | 1230 hrs | America's Cup C |
| 378-APA-37 | **Special Session: Sea-Based Aviation Aeromechanics Computational Analysis** | 7-Jan | 1400 hrs | 1730 hrs | Coronado E |
| 379-APA-38 | **Aerodynamic Testing: Wind-Tunnel II** | 7-Jan | 1400 hrs | 1730 hrs | America's Cup B |
| 380-APA-39 | **Airfoil/Wing/Configuration Aerodynamics II** | 7-Jan | 1400 hrs | 1730 hrs | America's Cup C |
| 381-APA-40 | **Propeller/Rotorcraft/Wind Turbine Aerodynamics II** | 7-Jan | 1400 hrs | 1730 hrs | America's Cup D |
| 432-APA-41 | **Applied CFD & Numerical Correlations with Experimental Data IV** | 8-Jan | 0900 hrs | 1230 hrs | America's Cup D |
| 433-APA-42 | **Aerodynamic-Structural Dynamics Interactions II** | 8-Jan | 0900 hrs | 1230 hrs | Coronado D |
| 434-APA-43 | **Lowspeed Flow Environment and UAV Integration** | 8-Jan | 0900 hrs | 1230 hrs | America's Cup C |
| 435-APA-44 | **Special Session: Low Boom Activities** | 8-Jan | 0900 hrs | 1230 hrs | Coronado E |
| 436-APA-45 | **Airfoil/Wing/Configuration Aerodynamics III** | 8-Jan | 0900 hrs | 1230 hrs | America's Cup B |
| | **Adaptive Structures** | | | | |
| 68-ASC-1 | **EU FP7 CHANGE (Special Session)** | 4-Jan | 1400 hrs | 1730 hrs | Gaslamp D |
| 177-ASC-2 | **Modeling and Analysis** | 5-Jan | 1400 hrs | 1730 hrs | Gaslamp D |
| 233-ASC-3 | **Design and Testing** | 6-Jan | 0900 hrs | 1230 hrs | Gaslamp D |
| 281-ASC-4 | **Wing Leading and Trailing Edge Morphing** | 6-Jan | 1400 hrs | 1730 hrs | Gaslamp D |
| 335-ASC-5 | **Shape Memory Alloys** | 7-Jan | 0900 hrs | 1230 hrs | Gaslamp D |
| 382-ASC-6 | **Health Monitoring** | 7-Jan | 1400 hrs | 1730 hrs | Gaslamp D |
| | **Computer Systems** | | | | |
| 124-CMS-1/CPS-1 | **Communication, Computing and Information Processing** | 5-Jan | 0900 hrs | 1230 hrs | Regatta B |
| | **Digital Avionics** | | | | |
| 437-DA-2 | **Avionics Technologies for Safe and Efficient Vehicle Operation in National Airspace** | 8-Jan | 0900 hrs | 1230 hrs | Regatta A |
| | **Design Engineering** | | | | |
| 125-DE-1 | **Design Processes and Tools** | 5-Jan | 0900 hrs | 1230 hrs | Old Town A |
| 178-DE-2 | **Innovative Designs in Aerospace / Design Education** | 5-Jan | 1400 hrs | 1730 hrs | Old Town A |

# Sessions at a Glance

| Abbreviation | Title | Date | Start Time | End Time | Location |
|---|---|---|---|---|---|
| | **Dynamics Specialists** | | | | |
| 337-EDU-1 | **Advancing Aerospace Education I** | 7-Jan | 0900 hrs | 1230 hrs | Bankers Hill |
| 235-DSC-2 | **Adaptive Aeroelastic Wing Shaping Control** | 6-Jan | 0900 hrs | 1230 hrs | Gaslamp C |
| 282-DSC-3 | **High Speed Systems** | 6-Jan | 1400 hrs | 1730 hrs | Gaslamp C |
| 336-DSC-4 | **Aircraft Loads Prediction - Special Session** | 7-Jan | 0900 hrs | 1230 hrs | Gaslamp C |
| 383-DSC-5 | **Nonlinear Aeroelasticity** | 7-Jan | 1400 hrs | 1730 hrs | Gaslamp C |
| 438-DSC-6 | **Aeroelasticity** | 8-Jan | 0900 hrs | 1230 hrs | Balboa C |
| | **Education** | | | | |
| 337-EDU-1 | **Advancing Aerospace Education I** | 7-Jan | 0900 hrs | 1230 hrs | Bankers Hill |
| 384-EDU-2 | **Advancing Aerospace Education II** | 7-Jan | 1400 hrs | 1730 hrs | Bankers Hill |
| | **Fluid Dynamics** | | | | |
| 14-FD-1/APA-5 | **Special Session: Low Re & Bio-Inspired Flows Discussion Group (Invited)** | 4-Jan | 0900 hrs | 1230 hrs | Harbor E |
| 15-FD-2 | **Acoustics and Compressible Flow Transition** | 4-Jan | 0900 hrs | 1230 hrs | Promenade B |
| 16-FD-3 | **Aerodynamic Flow Control** | 4-Jan | 0900 hrs | 1230 hrs | Cove |
| 17-FD-4 | **CFD Applications and Design** | 4-Jan | 0900 hrs | 1230 hrs | Pier |
| 18-FD-5 | **CFD: Time Integration and Preconditioning** | 4-Jan | 0900 hrs | 1230 hrs | Promenade A |
| 19-FD-6 | **Shock Boundary Layer Interaction I** | 4-Jan | 0900 hrs | 1230 hrs | Harbor F |
| 69-FD-8 | **Airfoil Flow Control** | 4-Jan | 1400 hrs | 1730 hrs | Cove |
| 70-FD-9 | **CFD Simulation of Vortex Flows** | 4-Jan | 1400 hrs | 1730 hrs | Pier |
| 126-FD-10 | **CFD: Turbulence Modeling** | 5-Jan | 0900 hrs | 1230 hrs | Promenade A |
| 71-FD-11 | **Compressible Boundary Layers** | 4-Jan | 1400 hrs | 1730 hrs | Harbor D |
| 72-FD-12 | **DNS/LES Techniques** | 4-Jan | 1400 hrs | 1730 hrs | Harbor E |
| 73-FD-13 | **Jet Flows I** | 4-Jan | 1400 hrs | 1730 hrs | Promenade B |
| 74-FD-14 | **Shock Boundary Layer Interaction II** | 4-Jan | 1400 hrs | 1730 hrs | Harbor F |
| 127-FD-15 | **Aqueous Flow Control and Flow Control Experiments** | 5-Jan | 0900 hrs | 1230 hrs | Cove |
| 128-FD-16 | **Boundary-Layer Transition** | 5-Jan | 0900 hrs | 1230 hrs | Promenade B |
| 129-FD-17 | **CFD: Cartesian and Mapped Grids** | 5-Jan | 0900 hrs | 1230 hrs | Pier |
| 130-FD-18 | **RANS/LES and Its Applications** | 5-Jan | 0900 hrs | 1230 hrs | Harbor E |
| 131-FD-19 | **Shock Boundary Layer Interaction III** | 5-Jan | 0900 hrs | 1230 hrs | Harbor F |
| 75-FD-20 | **Stability and Transition of Hypersonic Flows I** | 4-Jan | 1400 hrs | 1730 hrs | Promenade A |
| 179-FD-21 | **Bio-Inspired Flows** | 5-Jan | 1400 hrs | 1730 hrs | Promenade B |
| 180-FD-22 | **CFD: Error Estimation and Mesh Adaptation** | 5-Jan | 1400 hrs | 1730 hrs | Pier |
| 181-FD-23/PDL-6 | **DBD Plasma Actuators II** | 5-Jan | 1400 hrs | 1730 hrs | Harbor F |
| 182-FD-24 | **Stability and Transition of Hypersonic Flows II** | 5-Jan | 1400 hrs | 1730 hrs | Promenade A |
| 183-FD-25 | **Wing Aerodynamics** | 5-Jan | 1400 hrs | 1730 hrs | Cove |
| 184-FD-26/APA-21 | **Special Session: Evaluation of RANS Solvers on Benchmark Aerodynamic Flows I** | 5-Jan | 1400 hrs | 1730 hrs | Harbor E |
| 236-FD-28 | **CFD: Higher-Order Methods I** | 6-Jan | 0900 hrs | 1230 hrs | Pier |
| 237-FD-29 | **Flow Control Methods and Simulations** | 6-Jan | 0900 hrs | 1230 hrs | Cove |
| 238-FD-30 | **Jet Flows II** | 6-Jan | 0900 hrs | 1230 hrs | Promenade B |
| 239-FD-31 | **RANS/LES Methods and Techniques I** | 6-Jan | 0900 hrs | 1230 hrs | Harbor E |
| 240-FD-32 | **Subsonic Boundary Layers** | 6-Jan | 0900 hrs | 1230 hrs | Harbor F |

# Sessions at a Glance

| Abbreviation | Title | Date | Start Time | End Time | Location |
|---|---|---|---|---|---|
| | **Fluid Dynamics (continued)** | | | | |
| 241-FD-33 | **Surface Roughness & Disturbances in Supersonic Flow** | 6-Jan | 0900 hrs | 1230 hrs | Promenade A |
| 283-FD-34 | **CFD: Higher-Order Methods II** | 6-Jan | 1400 hrs | 1730 hrs | Pier |
| 284-FD-35 | **Discontinuous Galerkin Methods** | 6-Jan | 1400 hrs | 1730 hrs | Harbor F |
| 285-FD-36 | **Multiphase Flow I: Simulations and Models** | 6-Jan | 1400 hrs | 1730 hrs | Promenade B |
| 286-FD-37 | **Unsteady Vortex Flows** | 6-Jan | 1400 hrs | 1730 hrs | Promenade A |
| 287-FD-38 | **Unsteady Wing Aerodynamics** | 6-Jan | 1400 hrs | 1730 hrs | Cove |
| 288-FD-39/APA-31 | **Special Session: Evaluation of RANS Solvers on Benchmark Aerodynamic Flows II** | 6-Jan | 1400 hrs | 1730 hrs | Harbor E |
| 338-FD-42 | **CFD: Meshfree Methods and Non-Equilibrium Gas Dynamics** | 7-Jan | 0900 hrs | 1230 hrs | Pier |
| 339-FD-43 | **Experimental Investigations of High-Speed Flow** | 7-Jan | 0900 hrs | 1230 hrs | Harbor F |
| 340-FD-44 | **Multiphase Flow II: Liquid-Gas and Engines** | 7-Jan | 0900 hrs | 1230 hrs | Promenade B |
| 341-FD-45 | **RANS/LES Methods and Techniques II** | 7-Jan | 0900 hrs | 1230 hrs | Harbor E |
| 342-FD-46 | **Vortex Flows I** | 7-Jan | 0900 hrs | 1230 hrs | Promenade A |
| 385-FD-47 | **CFD: Multiphase and Multi-Species Flows** | 7-Jan | 1400 hrs | 1730 hrs | Pier |
| 386-FD-48 | **Exploiting Hardware and Software Advances in CFD** | 7-Jan | 1400 hrs | 1730 hrs | Cove |
| 387-FD-49 | **Flow-Control Actuators** | 7-Jan | 1400 hrs | 1730 hrs | Cortez Hill C |
| 388-FD-50 | **Flux Reconstruction/Correction Procedure via Reconstruction (FR/CPR)** | 7-Jan | 1400 hrs | 1730 hrs | Harbor F |
| 389-FD-51 | **RANS/LES of Separated Flows** | 7-Jan | 1400 hrs | 1730 hrs | Harbor E |
| 390-FD-52 | **Reacting Flows** | 7-Jan | 1400 hrs | 1730 hrs | Promenade B |
| 391-FD-53 | **Vortex Flows II: Experimental Investigations** | 7-Jan | 1400 hrs | 1730 hrs | Promenade A |
| 439-FD-54 | **CFD: Overset Methods** | 8-Jan | 0900 hrs | 1230 hrs | Pier |
| 440-FD-55 | **High-Speed Flow Methods & Simulations** | 8-Jan | 0900 hrs | 1230 hrs | Harbor E |
| 441-FD-56 | **Incompressible Flow Transition** | 8-Jan | 0900 hrs | 1230 hrs | Harbor F |
| 442-FD-57 | **Pitching/Heaving/Flapping Surfaces** | 8-Jan | 0900 hrs | 1230 hrs | Cove |
| 443-FD-58 | **Separated Fluid Flows** | 8-Jan | 0900 hrs | 1230 hrs | Promenade B |
| 444-FD-59 | **Vortex Flows III: Dynamical Systems Methods** | 8-Jan | 0900 hrs | 1230 hrs | Promenade A |
| 321-FD-60 | **Transition Open Forum** | 6-Jan | 1830 hrs | 2200 hrs | Old Town B |
| | **Green Engineering** | | | | |
| 185-GEPC-3 | **Noise Reduction and Flight Demonstrations** | 5-Jan | 1400 hrs | 1730 hrs | America's Cup A |
| 289-GEPC-4 | **Alternative Fuels and Green Engineering Computations** | 6-Jan | 1400 hrs | 1730 hrs | America's Cup B |
| | **Guidance, Navigation, and Control** | | | | |
| 20-GNC-1 | **Vehicle & Flight Control Validation** | 4-Jan | 0900 hrs | 1230 hrs | Hillcrest A |
| 21-GNC-2 | **Spacecraft Attitude Control I** | 4-Jan | 0900 hrs | 1230 hrs | Hillcrest B |
| 22-GNC-3 | **Invited Session: LOC-1, Onboard Systems for LOC Prevention and Recovery – Problem Analysis and Upset Prevention Methods** | 4-Jan | 0900 hrs | 1230 hrs | Coronado B |
| 23-GNC-4 | **Invited Session: EDL-1, Entry, Descent and Landing GN&C Technology I** | 4-Jan | 0900 hrs | 1230 hrs | Coronado A |
| 24-GNC-5 | **Aerospace Robotics and Unmanned/Autonomous Systems I** | 4-Jan | 0900 hrs | 1230 hrs | Hillcrest C |
| 76-GNC-6 | **Control Theory and Applications** | 4-Jan | 1400 hrs | 1730 hrs | Hillcrest A |
| 77-GNC-7 | **Spacecraft Attitude Control II** | 4-Jan | 1400 hrs | 1730 hrs | Hillcrest B |
| 78-GNC-8 | **Invited Session: LOC-2, Onboard Systems for LOC Prevention and Recovery – Real-Time Failure Detection, Isolation, and Redundancy Management** | 4-Jan | 1400 hrs | 1730 hrs | Coronado B |

# Sessions at a Glance

| Abbreviation | Title | Date | Start Time | End Time | Location |
|---|---|---|---|---|---|
| | **Guidance, Navigation, and Control (continued)** | | | | |
| 79-GNC-9 | **Invited Session: EDL-2, Entry, Descent and Landing GN&C Technology II** | 4-Jan | 1400 hrs | 1730 hrs | Coronado A |
| 80-GNC-10 | **Aerospace Robotics and Unmanned/Autonomous Systems II** | 4-Jan | 1400 hrs | 1730 hrs | Hillcrest C |
| 132-GNC-11 | **Adaptive Control** | 5-Jan | 0900 hrs | 1230 hrs | Hillcrest A |
| 133-GNC-12 | **Spacecraft Parameter Estimation and Modeling** | 5-Jan | 0900 hrs | 1230 hrs | Hillcrest B |
| 134-GNC-13 | **Invited Session: LOC-3, Onboard Systems for LOC Prevention and Recovery – Resilient Flight Control and Guidance Systems** | 5-Jan | 0900 hrs | 1230 hrs | Coronado B |
| 135-GNC-14 | **Aerospace Robotics and Unmanned/Autonomous Systems III** | 5-Jan | 0900 hrs | 1230 hrs | Hillcrest C |
| 136-GNC-15 | **Planning and Control for Mini/Micro UAVs** | 5-Jan | 0900 hrs | 1230 hrs | Hillcrest D |
| 186-GNC-16 | **Optimal Control: Methods and Applications** | 5-Jan | 1400 hrs | 1730 hrs | Hillcrest A |
| 187-GNC-17 | **Spacecraft Formations and Rendezvous** | 5-Jan | 1400 hrs | 1730 hrs | Hillcrest B |
| 188-GNC-18 | **Invited Session: LOC-4, Onboard Systems for LOC Prevention and Recovery – Upset Recovery and System Validation** | 5-Jan | 1400 hrs | 1730 hrs | Coronado B |
| 189-GNC-19 | **Aerospace Robotics and Unmanned/Autonomous Systems IV** | 5-Jan | 1400 hrs | 1730 hrs | Hillcrest C |
| 190-GNC-20 | **Control of Bio-Inspired Mini/Micro UAVs** | 5-Jan | 1400 hrs | 1730 hrs | Hillcrest D |
| 242-GNC-21 | **Spacecraft De-Orbiting, Reentry and Landing** | 6-Jan | 0900 hrs | 1230 hrs | Hillcrest B |
| 243-GNC-22 | **GN&C Sensor Systems** | 6-Jan | 0900 hrs | 1230 hrs | Hillcrest A |
| 244-GNC-23 | **Aerospace Robotics and Unmanned/Autonomous Systems V** | 6-Jan | 0900 hrs | 1230 hrs | Hillcrest C |
| 290-GNC-24 | **Spacecraft Trajectory Optimization and Orbit Control** | 6-Jan | 1400 hrs | 1730 hrs | Hillcrest B |
| 291-GNC-25 | **Invited Session: Advances in Guidance and Control of Unmanned Air Vehicles** | 6-Jan | 1400 hrs | 1730 hrs | Hillcrest A |
| 292-GNC-26 | **H Infinity, Nonlinear, and Adaptive Flight Control** | 6-Jan | 1400 hrs | 1730 hrs | Hillcrest C |
| 293-GNC-27 | **Control of Multirotor Aircraft** | 6-Jan | 1400 hrs | 1730 hrs | Cortez Hill B |
| 343-GNC-28 | **Invited Session: Interval Management: Operational Concept, Integration, and Benefits** | 7-Jan | 0900 hrs | 1230 hrs | Coronado B |
| 344-GNC-29 | **Novel Navigation, Estimation and Tracking I** | 7-Jan | 0900 hrs | 1230 hrs | Hillcrest A |
| 345-GNC-30/ACD-10 | **Aircraft GNC I** | 7-Jan | 0900 hrs | 1230 hrs | Hillcrest C |
| 346-GNC-31 | **GNC Concepts in Air Traffic Control** | 7-Jan | 0900 hrs | 1230 hrs | Cortez Hill B |
| 392-GNC-32 | **Invited Session: Interval Management: Avionics Algorithms and Performance Analysis** | 7-Jan | 1400 hrs | 1730 hrs | Coronado B |
| 393-GNC-33 | **Novel Navigation, Estimation and Tracking II** | 7-Jan | 1400 hrs | 1730 hrs | Hillcrest A |
| 394-GNC-34/ACD-12 | **Aircraft GNC II** | 7-Jan | 1400 hrs | 1730 hrs | Hillcrest C |
| 395-GNC-35 | **Trajectory Design** | 7-Jan | 1400 hrs | 1730 hrs | Cortez Hill B |
| 396-GNC-36 | **Missile Autopilots and Integrated Guidance & Control** | 7-Jan | 1400 hrs | 1730 hrs | Hillcrest B |
| 445-GNC-37 | **Invited Session: Flight Experience of Cassini Spacecraft Attitude Control at Saturn** | 8-Jan | 0900 hrs | 1230 hrs | Coronado B |
| 446-GNC-38 | **Vision-Based Sensing and Optical Navigation** | 8-Jan | 0900 hrs | 1230 hrs | Hillcrest A |
| 447-GNC-39 | **Flight Control of Unmanned Vehicles** | 8-Jan | 0900 hrs | 1230 hrs | Hillcrest C |
| 448-GNC-40 | **Intelligent and Cooperative Control in Aerospace Applications** | 8-Jan | 0900 hrs | 1230 hrs | Cortez Hill B |
| 449-GNC-41 | **Missile and Entry Vehicle Guidance** | 8-Jan | 0900 hrs | 1230 hrs | Hillcrest B |

# Sessions at a Glance

| Abbreviation | Title | Date | Start Time | End Time | Location |
|---|---|---|---|---|---|
| | **Ground Testing** | | | | |
| 25-GT-1 | **SAMURAI - Testing and Simulation of Real Engine Flows I (Invited)** | 4-Jan | 0900 hrs | 1230 hrs | Harbor I |
| 81-GT-2 | **SAMURAI - Testing and Simulation of Real Engine Flows II (Invited)** | 4-Jan | 1400 hrs | 1730 hrs | Hillcrest D |
| 137-GT-3 | **High Reynolds Number Aerodynamics and Testing (Invited)** | 5-Jan | 0900 hrs | 1230 hrs | Harbor B |
| 191-GT-4 | **Integration of Experimental and Computational Methods (Invited)** | 5-Jan | 1400 hrs | 1730 hrs | Harbor H |
| 245-GT-5 | **Ground Test Studies and Techniques** | 6-Jan | 0900 hrs | 1230 hrs | Cortez Hill B |
| 347-GT-7 | **Aerodynamic Force Measurement and NFMTC Update (Invited)** | 7-Jan | 0900 hrs | 1230 hrs | Cove |
| 397-GT-8 | **Model Attitude, Deformation, and Data Acquisition Techniques (Invited)** | 7-Jan | 1400 hrs | 1730 hrs | Hillcrest D |
| 450-GT-9 | **Ground Test Methodologies and CFD Integration** | 8-Jan | 0900 hrs | 1230 hrs | Hillcrest D |
| | **Gas Turbine Engines** | | | | |
| 26-GTE-1 | **Turbine Technologies** | 4-Jan | 0900 hrs | 1230 hrs | Gaslamp D |
| 27-GTE-2 | **Cycles and Auxiliary Systems** | 4-Jan | 0900 hrs | 1230 hrs | Harbor H |
| 82-GTE-3 | **Compression Systems I** | 4-Jan | 1400 hrs | 1730 hrs | Gaslamp C |
| 138-GTE-4 | **Compression Systems II** | 5-Jan | 0900 hrs | 1230 hrs | Cortez Hill C |
| 139-GTE-5 | **Turbine Cooling I** | 5-Jan | 0900 hrs | 1230 hrs | Gaslamp D |
| 192-GTE-6 | **Gas Turbine Engine with Pressure Gain Combustion** | 5-Jan | 1400 hrs | 1730 hrs | Harbor C |
| 193-GTE-7 | **Turbine Cooling II** | 5-Jan | 1400 hrs | 1730 hrs | Harbor B |
| 246-GTE-8 | **Combustion I** | 6-Jan | 0900 hrs | 1230 hrs | Cortez Hill C |
| 294-GTE-10 | **Combustion II** | 6-Jan | 1400 hrs | 1730 hrs | Cortez Hill C |
| 348-GTE-11 | **Jet Noise** | 7-Jan | 0900 hrs | 1230 hrs | Cortez Hill C |
| 349-GTE-12 | **Methodologies for Advanced Components** | 7-Jan | 0900 hrs | 1230 hrs | Golden Hill A |
| 398-GTE-13 | **Noise** | 7-Jan | 1400 hrs | 1730 hrs | Old Town A |
| 399-GTE-14 | **Experimental Tools** | 7-Jan | 1400 hrs | 1730 hrs | Old Town B |
| 451-GTE-15 | **Combustion III** | 8-Jan | 0900 hrs | 1230 hrs | Gaslamp B |
| 452-GTE-16 | **Numerical Tools** | 8-Jan | 0900 hrs | 1230 hrs | Old Town A |
| | **History** | | | | |
| 140-HIS-1 | **Aerospace Archives: All is not Lost - Keepers of the Right Stuff** | 5-Jan | 0900 hrs | 1230 hrs | America's Cup A |
| 247-HIS-2 | **Aerospace History** | 6-Jan | 0900 hrs | 1230 hrs | America's Cup A |
| 295-HIS-3 | **Boeing Centennial 1916-2016 I** | 6-Jan | 1400 hrs | 1730 hrs | America's Cup A |
| 350-HIS-4 | **Boeing Centennial 1916-2016 II** | 7-Jan | 0900 hrs | 1230 hrs | America's Cup A |
| 400-HIS-5 | **History of AIAA** | 7-Jan | 1400 hrs | 1730 hrs | America's Cup A |
| | **High Speed Air Breathing Propulsion** | | | | |
| 28-HSABP-1 | **Advances in Pressure Gain Combustion I - RDE & PDE** | 4-Jan | 0900 hrs | 1230 hrs | Harbor B |
| 141-HSABP-2 | **Scramjet Combustors** | 5-Jan | 0900 hrs | 1230 hrs | Regatta A |
| 194-HSABP-3 | **Scramjet Performance and Optimization** | 5-Jan | 1400 hrs | 1730 hrs | Regatta A |
| 248-HSABP-4 | **Scramjet Inlets** | 6-Jan | 0900 hrs | 1230 hrs | Regatta A |
| 296-HSABP-5 | **Advances in Pressure Gain Combustion II - RDE & PDE** | 6-Jan | 1400 hrs | 1730 hrs | Regatta A |
| 351-HSABP-6 | **Advances in Pressure Gain Combustion III - RDE, PDE, & Pulse Combustion** | 7-Jan | 0900 hrs | 1230 hrs | Regatta A |
| 402-HSABP-7 | **Computational Analysis of Scramjets** | 7-Jan | 1400 hrs | 1730 hrs | Regatta A |
| | **Information and Command & Control Systems** | | | | |
| 195-ICC-2 | **Information and Command and Control Systems** | 5-Jan | 1400 hrs | 1730 hrs | Regatta B |

# Sessions at a Glance

| Abbreviation | Title | Date | Start Time | End Time | Location |
|---|---|---|---|---|---|
| | **Intelligent Systems** | | | | |
| 29-IS-1/ICC-1/ DA-1 | **Student Paper Competition -- Information Systems Group** | 4-Jan | 0900 hrs | 1230 hrs | Regatta B |
| 83-IS-2 | **Intelligent and Adaptive Aerospace Control** | 4-Jan | 1400 hrs | 1730 hrs | Regatta B |
| 142-IS-3 | **Big Data Analytics** | 5-Jan | 0900 hrs | 1100 hrs | Coronado A |
| 165-IS-4 | **Intelligent Systems Autonomy Roadmap Panel** | 5-Jan | 1100 hrs | 1230 hrs | Coronado A |
| 196-IS-5 | **Novel Aerospace Applications of Intelligent Systems** | 5-Jan | 1400 hrs | 1730 hrs | Regatta C |
| 297-IS-7 | **Machine Learning and Probabilistic Reasoning for Intelligent UAS** | 6-Jan | 1400 hrs | 1730 hrs | Regatta B |
| 352-IS-9 | **Intelligent Human-Automation Interaction** | 7-Jan | 0900 hrs | 1230 hrs | Regatta B |
| 403-IS-11 | **Intelligent Mission Design and Vehicle Control** | 7-Jan | 1400 hrs | 1730 hrs | Regatta B |
| 453-IS-13 | **Intelligent Integrated Systems Health Management** | 8-Jan | 0900 hrs | 1230 hrs | Regatta B |
| | **International Student Conference** | | | | |
| 30-ISC-1 | **International Student Conference - Undergraduate Category** | 4-Jan | 0900 hrs | 1230 hrs | Torrey Hills A |
| 31-ISC-2 | **International Student Conference - Masters Category** | 4-Jan | 0900 hrs | 1230 hrs | Torrey Hills B |
| 84-ISC-3 | **International Student Conference -Team Category** | 4-Jan | 1400 hrs | 1730 hrs | Torrey Hills B |
| 85-ISC-4 | **ISC-Community Outreach Category** | 4-Jan | 1400 hrs | 1530 hrs | Torrey Hills A |
| | **Materials** | | | | |
| 33-MAT-1 | **Nanostructured Materials I** | 4-Jan | 0900 hrs | 1230 hrs | Gaslamp B |
| 34-MAT-2 | **Fatigue & Fracture I** | 4-Jan | 0900 hrs | 1230 hrs | Gaslamp C |
| 87-MAT-3 | **Materials Testing & Characterization I** | 4-Jan | 1400 hrs | 1730 hrs | Gaslamp B |
| 144-MAT-4 | **Materials Testing & Characterization II** | 5-Jan | 0900 hrs | 1230 hrs | Gaslamp B |
| 198-MAT-5 | **Fatigue & Fracture II** | 5-Jan | 1400 hrs | 1730 hrs | Gaslamp B |
| 199-MAT-6 | **Nanostructured Materials II** | 5-Jan | 1400 hrs | 1730 hrs | Gaslamp C |
| 249-MAT-7 | **Integrated Computational Materials Engineering (ICME)** | 6-Jan | 0900 hrs | 1230 hrs | Gaslamp B |
| 298-MAT-8 | **Advanced Materials and Processing** | 6-Jan | 1400 hrs | 1730 hrs | Gaslamp B |
| 353-MAT-9 | **Materials & Design for Additive Manufacturing** | 7-Jan | 0900 hrs | 1230 hrs | Gaslamp B |
| 409-MAT-10 | **Work Force Development for Integrated Computational Materials Engineering** | 7-Jan | 1400 hrs | 1700 hrs | Gaslamp B |
| | **Multidisciplinary Design Optimization** | | | | |
| 35-MDO-1 | **Aero & Structural Technology Investigations** | 4-Jan | 0900 hrs | 1230 hrs | Balboa A |
| 88-MDO-2 | **Design Space Exploration** | 4-Jan | 1400 hrs | 1730 hrs | Balboa A |
| 145-MDO-3 | **Propulsion & Thermal Design Considerations** | 5-Jan | 0900 hrs | 1230 hrs | Balboa A |
| 200-MDO-4 | **Topology Methods and Applications** | 5-Jan | 1400 hrs | 1730 hrs | Balboa A |
| 250-MDO-5 | **Aeroelastic Sensitivity Analysis & Applications** | 6-Jan | 0900 hrs | 1230 hrs | Balboa A |
| 299-MDO-6 | **Design Including Uncertainty & Frameworks** | 6-Jan | 1400 hrs | 1730 hrs | Balboa A |
| 354-MDO-7 | **Mission Driven Design** | 7-Jan | 0900 hrs | 1230 hrs | Balboa A |
| 404-MDO-8 | **Sensitivity Derivations & Optimization Applications** | 7-Jan | 1400 hrs | 1730 hrs | Balboa A |

# Sessions at a Glance

| Abbreviation | Title | Date | Start Time | End Time | Location |
|---|---|---|---|---|---|
| | **Modeling and Simulation Technologies** | | | | |
| 36-MST-1 | **Modeling and Simulation of Air Traffic Management I** | 4-Jan | 0900 hrs | 1230 hrs | Golden Hill A |
| 37-MST-2 | **Special Topics in Modeling and Simulation** | 4-Jan | 0900 hrs | 1230 hrs | Hillcrest D |
| 89-MST-3 | **Modeling and Simulation of Air Traffic Management II** | 4-Jan | 1400 hrs | 1730 hrs | Golden Hill A |
| 146-MST-4 | **Modeling of Space Systems and Dynamics** | 5-Jan | 0900 hrs | 1230 hrs | Golden Hill A |
| 201-MST-5 | **Uninhabited Aerial Systems and Vehicle Dynamics** | 5-Jan | 1400 hrs | 1730 hrs | Golden Hill A |
| 251-MST-6 | **Human Factors, Perception, and Cueing** | 6-Jan | 0900 hrs | 1230 hrs | Golden Hill A |
| 252-MST-7 | **Modeling of Vehicle Dynamics, Systems, and Environments** | 6-Jan | 0900 hrs | 1230 hrs | Golden Hill B |
| 300-MST-8 | **Hardware-in-the-Loop Simulation** | 6-Jan | 1400 hrs | 1730 hrs | Golden Hill A |
| 301-MST-9 | **Invited Session: LOC-6, Simulation-Based Evaluations for Improved Pilot Insights and Training for LOC Prevention and Recovery** | 6-Jan | 1400 hrs | 1730 hrs | Coronado B |
| 302-MST-10 | **Motion Systems, Visual Systems, and Image Generation** | 6-Jan | 1400 hrs | 1730 hrs | Golden Hill B |
| 355-MST-11 | **Model Design and Development** | 7-Jan | 0900 hrs | 1230 hrs | Golden Hill B |
| 405-MST-12 | **Computational Methods I** | 7-Jan | 1400 hrs | 1730 hrs | Golden Hill B |
| 406-MST-13 | **Model and Simulation Verification and Validation** | 7-Jan | 1400 hrs | 1730 hrs | Golden Hill A |
| 454-MST-14 | **Rotorcraft Modeling and Simulation Technologies** | 8-Jan | 0900 hrs | 1230 hrs | Golden Hill A |
| 455-MST-15 | **Computational Methods II** | 8-Jan | 0900 hrs | 1230 hrs | Golden Hill B |
| | **Meshing, Visualization, and Computational Environments** | | | | |
| 356-MVC-1 | **Grid Generation** | 7-Jan | 0900 hrs | 1230 hrs | Nautical |
| 407-MVC-2 | **Geometry & Computational Environments** | 7-Jan | 1400 hrs | 1730 hrs | Nautical |
| | **Non-Deterministic Approaches** | | | | |
| 90-NDA-1 | **Surrogate Modeling Approaches for Uncertainty Quantification and Reliability Estimation** | 4-Jan | 1400 hrs | 1730 hrs | Old Town B |
| 147-NDA-2 | **Analysis and Optimization Under Uncertainty** | 5-Jan | 0900 hrs | 1230 hrs | Old Town B |
| 202-NDA-3 | **Testing in Support of Model Calibration or Uncertainty Quantification** | 5-Jan | 1400 hrs | 1730 hrs | Old Town B |
| 253-NDA-4 | **Model Calibration, Verification, Validation, Uncertainty Quantification** | 6-Jan | 0900 hrs | 1230 hrs | Old Town B |
| 303-NDA-5 | **Non-Deterministic Methods** | 6-Jan | 1400 hrs | 1730 hrs | Old Town B |
| 357-NDA-6 | **Reliability and Life Prediction** | 7-Jan | 0900 hrs | 1230 hrs | Old Town B |
| | **Propellants and Combustion** | | | | |
| 39-PC-1 | **Combustion Chemistry** | 4-Jan | 0900 hrs | 1230 hrs | Harbor C |
| 40-PC-2 | **Advanced Concepts, Combustion Diagnostics, Environmental Impact** | 4-Jan | 0900 hrs | 1230 hrs | Cortez Hill C |
| 92-PC-3 | **Combustion Diagnostics** | 4-Jan | 1400 hrs | 1730 hrs | Harbor B |
| 93-PC-4 | **Detonations, Explosions, and Supersonic Combustion** | 4-Jan | 1400 hrs | 1730 hrs | Harbor C |
| 94-PC-5 | **High-Pressure Combustion, Fuel Technology** | 4-Jan | 1400 hrs | 1730 hrs | Cortez Hill C |
| 149-PC-6 | **Heterogeneous Propellants and Combustion, Fuel Technology** | 5-Jan | 0900 hrs | 1230 hrs | Harbor C |
| 204-PC-8 | **Micro-Propulsion, Plasma Discharges, Autoignition** | 5-Jan | 1400 hrs | 1730 hrs | Cortez Hill C |
| 255-PC-9/GTE-9 | **Rotating-Detonation Engines** | 6-Jan | 0900 hrs | 1230 hrs | Harbor B |
| 256-PC-10 | **Laminar Flames** | 6-Jan | 0900 hrs | 1230 hrs | Harbor C |
| 305-PC-12 | **Spray and Droplet Combustion I** | 6-Jan | 1400 hrs | 1730 hrs | Harbor B |
| 306-PC-13 | **Turbulent Combustion I - Experiments** | 6-Jan | 1400 hrs | 1730 hrs | Harbor C |
| 359-PC-14 | **Spray and Droplet Combustion II** | 7-Jan | 0900 hrs | 1230 hrs | Harbor B |
| 360-PC-15 | **Turbulent Combustion II - Fuel Chemistry** | 7-Jan | 0900 hrs | 1230 hrs | Harbor C |

# Sessions at a Glance

| Abbreviation | Title | Date | Start Time | End Time | Location |
|---|---|---|---|---|---|
| **Propellants and Combustion (continued)** | | | | | |
| 410-PC-16 | **Rocket & Air-Breathing Combustion I - Combustion Instabilities, Supercritical Conditions** | 7-Jan | 1400 hrs | 1730 hrs | Harbor B |
| 411-PC-17 | **Turbulent Combustion III - Large-Eddy Simulations** | 7-Jan | 1400 hrs | 1730 hrs | Harbor C |
| 457-PC-18 | **Rocket & Air-Breathing Combustion II** | 8-Jan | 0900 hrs | 1230 hrs | Harbor B |
| 458-PC-19 | **Turbulent Combustion IV** | 8-Jan | 0900 hrs | 1230 hrs | Harbor C |
| **Plasmadynamics and Lasers** | | | | | |
| 41-PDL-1 | **Plasma Assisted Combustion** | 4-Jan | 0900 hrs | 1230 hrs | Harbor D |
| 42-PDL-2 | **DBD Plasma Actuators I** | 4-Jan | 0900 hrs | 1230 hrs | Ocean Beach |
| 95-PDL-3 | **Plasma Based Flow Control** | 4-Jan | 1400 hrs | 1730 hrs | Ocean Beach |
| 96-PDL-4 | **Laser Discharge and Applications** | 4-Jan | 1400 hrs | 1730 hrs | Cortez Hill A |
| 150-PDL-5/PC-7/ AMT-3 | **Special Walter Lempert Memorial Session I (Invited)** | 5-Jan | 0900 hrs | 1230 hrs | Harbor D |
| 257-PDL-7 | **ns-DBD Plasma Actuator** | 6-Jan | 0900 hrs | 1230 hrs | Ocean Beach |
| 307-PDL-9/FD-40 | **Experimental and Numerical Studies of Large Eddy Structures** | 6-Jan | 1400 hrs | 1730 hrs | Ocean Beach |
| 361-PDL-10 | **Novel Plasma Actuators, Concepts and Systems** | 7-Jan | 0900 hrs | 1230 hrs | Old Town A |
| 362-PDL-11 | **Plasma Diagnostics** | 7-Jan | 0900 hrs | 1230 hrs | Ocean Beach |
| 412-PDL-12 | **Plasma Propulsion** | 7-Jan | 1400 hrs | 1730 hrs | Ocean Beach |
| 459-PDL-13 | **Numerical Modeling of Plasmas** | 8-Jan | 0900 hrs | 1230 hrs | Ocean Beach |
| **Society and Aerospace Technology** | | | | | |
| 401-SAT-1 | **Society and Aerospace Technology** | 7-Jan | 1400 hrs | 1730 hrs | America's Cup A |
| **Small Satellites** | | | | | |
| 151-SATS-1 | **Small Satellites - Technologies I** | 5-Jan | 0900 hrs | 1230 hrs | Ocean Beach |
| 205-SATS-2 | **Small Satellites - Technologies II** | 5-Jan | 1400 hrs | 1730 hrs | Ocean Beach |
| 308-SATS-3 | **Small Satellites - Missions** | 6-Jan | 1400 hrs | 1730 hrs | Hillcrest D |
| **Spacecraft Structures** | | | | | |
| 152-SCS-1 | **Spacecraft Antennas and Apertures** | 5-Jan | 0900 hrs | 1230 hrs | Balboa B |
| 206-SCS-2 | **High-Strain Composite Materials and Structures** | 5-Jan | 1400 hrs | 1730 hrs | Balboa B |
| 258-SCS-3 | **Spacecraft Membranes, Booms, and Trusses I** | 6-Jan | 0900 hrs | 1230 hrs | Balboa B |
| 309-SCS-4 | **Spacecraft Membranes, Booms, and Trusses II** | 6-Jan | 1400 hrs | 1730 hrs | Balboa B |
| 363-SCS-5 | **Spacecraft Solar Array Structures I** | 7-Jan | 0900 hrs | 1230 hrs | Balboa B |
| 413-SCS-6 | **Spacecraft Solar Array Structures II** | 7-Jan | 1400 hrs | 1730 hrs | Balboa B |
| 460-SCS-7 | **Packaging and Deployment of Spacecraft Structures** | 8-Jan | 0900 hrs | 1230 hrs | Balboa B |
| **Structural Dynamics** | | | | | |
| 43-SD-1 | **Structural Dynamic Modeling and Analysis** | 4-Jan | 0900 hrs | 1230 hrs | Balboa C |
| 44-SD-2 | **Energy Harvesting** | 4-Jan | 0900 hrs | 1230 hrs | Gaslamp A |
| 97-SD-3 | **Reduced Order Modeling I** | 4-Jan | 1400 hrs | 1730 hrs | Balboa C |
| 98-SD-4 | **Dynamic Loads, Response, and Vibration I** | 4-Jan | 1400 hrs | 1730 hrs | Gaslamp A |
| 153-SD-5 | **Turbomachinery / Structural Health Monitoring** | 5-Jan | 0900 hrs | 1230 hrs | Balboa C |
| 154-SD-6 | **Dynamics, Feedback Control, and Aeroservoelasticity I** | 5-Jan | 0900 hrs | 1230 hrs | Gaslamp A |
| 259-SD-7 | **Dynamics, Feedback Control, and Aeroservoelasticity II** | 6-Jan | 0900 hrs | 1230 hrs | Balboa C |
| 310-SD-8 | **Passive Control and Damping** | 6-Jan | 1400 hrs | 1730 hrs | Balboa C |
| 311-SD-9 | **Gust Loads, Response, and Control** | 6-Jan | 1400 hrs | 1730 hrs | Gaslamp A |

# Sessions at a Glance

| Abbreviation | Title | Date | Start Time | End Time | Location |
|---|---|---|---|---|---|
| | **Structural Dynamics (continued)** | | | | |
| 364-SD-10 | **Reduced Order Modeling II** | 7-Jan | 0900 hrs | 1230 hrs | Balboa C |
| 414-SD-12 | **System ID** | 7-Jan | 1400 hrs | 1730 hrs | Balboa C |
| 415-SD-13 | **Flutter** | 7-Jan | 1400 hrs | 1730 hrs | Gaslamp A |
| 461-SD-14 | **Dynamic Loads, Response, and Vibration II** | 8-Jan | 0900 hrs | 1230 hrs | Gaslamp A |
| | **Systems Engineering** | | | | |
| 45-SE-1 | **Systems Engineering I** | 4-Jan | 0900 hrs | 1230 hrs | America's Cup B |
| 99-SE-2 | **Systems Engineering II** | 4-Jan | 1400 hrs | 1730 hrs | La Jolla B |
| 207-SE-3 | **Systems Engineering III** | 5-Jan | 1400 hrs | 1730 hrs | Balboa C |
| | **Sensor Systems** | | | | |
| 260-SEN-1 | **Novel Sensor Systems and Sensing Techniques I** | 6-Jan | 0900 hrs | 1230 hrs | Regatta C |
| 312-SEN-2 | **Novel Sensor Systems and Sensing Techniques II** | 6-Jan | 1400 hrs | 1730 hrs | Regatta C |
| 365-SEN-3 | **Advanced Data Fusion Techniques** | 7-Jan | 0900 hrs | 1230 hrs | Regatta C |
| | **Space Exploration and Operations** | | | | |
| 46-SEO-1 | **Intelligent and Autonomous Systems for Improving Space Exploration and Operations** | 4-Jan | 0900 hrs | 1230 hrs | America's Cup A |
| 100-SEO-2 | **Innovative Ideas for Exploring and Operating Space Missions** | 4-Jan | 1400 hrs | 1730 hrs | America's Cup A |
| | **Software Systems** | | | | |
| 47-SOF-1 | **Software Architecture and Robust Software Engineering** | 4-Jan | 0900 hrs | 1030 hrs | Regatta A |
| 56-SOF-2 | **Lightweight Perfection: Why and How You Should Review Code for Small Teams** | 4-Jan | 1030 hrs | 1230 hrs | Regatta A |
| 101-SOF-3 | **Software Challenges in Aerospace Symposium** | 4-Jan | 1400 hrs | 1600 hrs | Regatta A |
| 261-SOF-5/UMS-5/IS-6 | **Assurance of Autonomy Symposium I** | 6-Jan | 0900 hrs | 1230 hrs | Coronado A |
| 313-SOF-6/UMS-7/IS-8 | **Assurance of Autonomy Symposium II** | 6-Jan | 1400 hrs | 1730 hrs | Coronado A |
| 366-SOF-7/UMS-8/IS-10 | **Assurance of Autonomy Symposium III** | 7-Jan | 0900 hrs | 1200 hrs | Coronado A |
| 416-SOF-8/UMS-9/IS-12 | **Assurance of Autonomy Symposium IV** | 7-Jan | 1400 hrs | 1730 hrs | Coronado A |
| | **Space Resources Utilization** | | | | |
| 48-SRE-1 | **Extraterrestrial Water: Prospecting and Acquisition** | 4-Jan | 0900 hrs | 1230 hrs | Bankers Hill |
| 155-SRE-2 | **ISRU Technologies and Trades** | 5-Jan | 0900 hrs | 1230 hrs | Bankers Hill |
| | **Structures** | | | | |
| 49-STR-1 | **Aircraft Structural Design I** | 4-Jan | 0900 hrs | 1230 hrs | La Jolla A |
| 50-STR-2 | **Challenges in the Design of Joined Wings** | 4-Jan | 0900 hrs | 1230 hrs | La Jolla B |
| 102-STR-3 | **Aircraft Structural Design II** | 4-Jan | 1400 hrs | 1730 hrs | La Jolla A |
| 156-STR-4 | **Special Session: USAF Benchmarking of Composite Fatigue Prediction Methods** | 5-Jan | 0900 hrs | 1230 hrs | La Jolla A |
| 157-STR-5 | **Failure Analysis and Prediction I** | 5-Jan | 0900 hrs | 1230 hrs | La Jolla B |
| 208-STR-6 | **Composite Fatigue Damage Prediction Methods** | 5-Jan | 1400 hrs | 1730 hrs | La Jolla A |
| 209-STR-7 | **Failure Analysis and Prediction II** | 5-Jan | 1400 hrs | 1730 hrs | La Jolla B |
| 262-STR-8 | **Design, Test and Analysis of Composite Structures I** | 6-Jan | 0900 hrs | 1230 hrs | La Jolla A |
| 263-STR-9 | **Other Topics in Structures** | 6-Jan | 0900 hrs | 1230 hrs | La Jolla B |

# Sessions at a Glance

| Abbreviation | Title | Date | Start Time | End Time | Location |
|---|---|---|---|---|---|
| | **Structures (continued)** | | | | |
| 314-STR-10 | **Design, Test and Analysis of Composite Structures II** | 6-Jan | 1400 hrs | 1730 hrs | La Jolla A |
| 315-STR-11 | **Structural Joints and Repairs** | 6-Jan | 1400 hrs | 1730 hrs | La Jolla B |
| 367-STR-12 | **Spacecraft Structural Design** | 7-Jan | 0900 hrs | 1230 hrs | La Jolla A |
| 368-STR-13 | **Buckling, Fatigue, and Fracture of Structures I** | 7-Jan | 0900 hrs | 1230 hrs | La Jolla B |
| 417-STR-14 | **Composite Laminate Optimization** | 7-Jan | 1400 hrs | 1730 hrs | La Jolla A |
| 418-STR-15 | **Buckling, Fatigue, and Fracture of Structures II** | 7-Jan | 1400 hrs | 1730 hrs | La Jolla B |
| 462-STR-16 | **Special Session: Stiffened, Stitched Composite Structures** | 8-Jan | 0900 hrs | 1230 hrs | La Jolla A |
| 463-STR-17 | **Impact Damage in Composites** | 8-Jan | 0900 hrs | 1230 hrs | La Jolla B |
| | **Survivability** | | | | |
| 264-SUR-1 | **Air and Space Survivability I** | 6-Jan | 0900 hrs | 1230 hrs | Old Town A |
| 316-SUR-2 | **Air and Space Survivability II** | 6-Jan | 1400 hrs | 1730 hrs | Old Town A |
| | **Terrestial Energy** | | | | |
| 51-TES-1 | **The State and Future of Energy Systems** | 4-Jan | 0900 hrs | 1230 hrs | Old Town A |
| 52-TES-2/TP-1 | **Joint Session: Heat Transfer in Terrestrial Energy Systems** | 4-Jan | 0900 hrs | 1230 hrs | Old Town B |
| 103-TES-3 | **Fluids and Combustion in Power Systems** | 4-Jan | 1400 hrs | 1730 hrs | Old Town A |
| 158-TES-4 | **Electrochemical Power for Aerospace Missions** | 5-Jan | 0900 hrs | 1230 hrs | Gaslamp C |
| 210-TES-5 | **Design of Energy Systems** | 5-Jan | 1400 hrs | 1730 hrs | Gaslamp A |
| | **Thermophysics** | | | | |
| 53-TP-2 | **Thermal Protection System, Ablation and Surface Catalysis I** | 4-Jan | 0900 hrs | 1230 hrs | Harbor G |
| 104-TP-3 | **Non-Equilibrium Flows, Non-Equilibrium Radiation and Rarefied Flows I** | 4-Jan | 1400 hrs | 1730 hrs | Harbor G |
| 105-TP-4 | **Heat Transfer: Conduction, Convection, Phase Change, Radiation, and Conjugate Heat Transfer** | 4-Jan | 1400 hrs | 1730 hrs | Harbor H |
| 159-TP-5 | **Aerothermodynamics I** | 5-Jan | 0900 hrs | 1230 hrs | Harbor G |
| 211-TP-6 | **Special Session: Aerothermodynamics of Meteor Entries** | 5-Jan | 1400 hrs | 1730 hrs | Harbor G |
| 265-TP-7 | **Aerothermodynamics II** | 6-Jan | 0900 hrs | 1230 hrs | Harbor G |
| 317-TP-8 | **Thermal Protection System, Ablation and Surface Catalysis II** | 6-Jan | 1400 hrs | 1730 hrs | Harbor G |
| 369-TP-9 | **Non-Equilibrium Flows, Non-Equilibrium Radiation and Rarefied Flows II** | 7-Jan | 0900 hrs | 1230 hrs | Harbor G |
| 419-TP-10 | **Experimental Measurements and Techniques in Heat Transfer and Related Physical Phenomena** | 7-Jan | 1400 hrs | 1730 hrs | Harbor G |
| 464-TP-11 | **Thermal Systems and Devices: Cryogenics, Thermal Management, and Microdevices** | 8-Jan | 0900 hrs | 1230 hrs | Harbor G |
| 465-TP-12 | **Special Session: University Space Systems Programs and Microgravity Flight Activities** | 8-Jan | 0900 hrs | 1230 hrs | Harbor H |

# Sessions at a Glance

| Abbreviation | Title | Date | Start Time | End Time | Location |
|---|---|---|---|---|---|
| | **Unmanned Systems** | | | | |
| 54-UMS-1 | **Unmanned Systems: Mission Management and Planning Technologies** | 4-Jan | 0900 hrs | 1230 hrs | Regatta C |
| 106-UMS-2 | **Unmanned Systems - Flight Dynamics and Control** | 4-Jan | 1400 hrs | 1730 hrs | Regatta C |
| 160-UMS-3 | **Unmanned Systems: Missions and Applications** | 5-Jan | 0900 hrs | 1230 hrs | Regatta C |
| 212-UMS-4 | **Unmanned Systems: UAS Integration into National Airspace System and Civil Applications** | 5-Jan | 1400 hrs | 1730 hrs | Coronado A |
| 266-UMS-6 | **Unmanned Systems: Novel Platforms and Controls** | 6-Jan | 0900 hrs | 1230 hrs | Regatta B |
| 420-UMS-10 | **Unmanned Systems: Detect-and-Avoid I** | 7-Jan | 1400 hrs | 1730 hrs | Regatta C |
| 466-UMS-11 | **Unmanned Systems: Detect-and-Avoid II** | 8-Jan | 0900 hrs | 1230 hrs | Regatta C |
| | **Wind Energy** | | | | |
| 107-WE-1 | **Wind Energy: Wind Turbine Aerodynamics Improvements and Analysis** | 4-Jan | 1400 hrs | 1730 hrs | Harbor I |
| 161-WE-2 | **Wind Energy: Wind Turbine Aerodynamics Modeling I** | 5-Jan | 0900 hrs | 1230 hrs | Harbor H |
| 162-WE-3 | **Wind Energy: Structural Dynamics and Materials** | 5-Jan | 0900 hrs | 1230 hrs | Harbor I |
| 213-WE-4 | **Wind Energy: Aero-Elastic Modeling and Validation** | 5-Jan | 1400 hrs | 1730 hrs | Harbor I |
| 267-WE-5 | **Wind Energy: Wind Turbine Aerodynamics Modeling II** | 6-Jan | 0900 hrs | 1230 hrs | Harbor H |
| 268-WE-6 | **Wind Energy: Rotor Design** | 6-Jan | 0900 hrs | 1230 hrs | Harbor I |
| 318-WE-7 | **Wind Energy: Wind Turbine Wakes** | 6-Jan | 1400 hrs | 1730 hrs | Harbor I |
| 370-WE-8 | **Wind Energy: VAWT Aerodynamics** | 7-Jan | 0900 hrs | 1230 hrs | Harbor H |
| 371-WE-9 | **Wind Energy: Wind Turbine and Wind Plant Control** | 7-Jan | 0900 hrs | 1230 hrs | Harbor I |
| 421-WE-10 | **Wind Energy: Wind Plant Aerodynamics and Atmospheric Inflow** | 7-Jan | 1400 hrs | 1730 hrs | Harbor H |
| 422-WE-11 | **Wind Energy: Offshore Wind Systems** | 7-Jan | 1400 hrs | 1730 hrs | Harbor I |
| 467-WE-12 | **Wind Energy: Wind Plant Optimization** | 8-Jan | 0900 hrs | 1230 hrs | Harbor I |

## Sunday

| Sunday, 3 January 2016 | | |
|---|---|---|
| 1-NW-1<br>1800 - 1930 hrs | Student Welcome Reception | Seaport H |
| All students and attendees welcome | | |

## Monday

| Monday, 4 January 2016 | | |
|---|---|---|
| 2-NW-2<br>0700 - 0730 hrs | Monday Early Morning Networking Coffee Break | Session Room Foyers |

| Monday, 4 January 2016 | | |
|---|---|---|
| 3-SB-1<br>0730 - 0800 hrs | Monday Morning Speakers' Briefing | Session Rooms |

| Monday, 4 January 2016 | | |
|---|---|---|
| 4-PLNRY-1<br>0800 - 0900 hrs | Monday Morning Plenary Panel<br><br>Aerospace S&T Policy in the 2016 Political Arena | Seaport A-E |

Moderator: Courtney Stadd, Management Advisor, Catalyst Partners, LLC

Panelists:

| Timothy Persons | Daniel Goldin | Jacques Gansler | Carissa Christensen | Mark Albrecht |
|---|---|---|---|---|
| Chief Scientist | Chairman, President & CEO | Founder, Chair and CEO | Managing Partner | Chairman of the Board |
| U.S. Government Accountability Office | Intellisis Corporation | The Gansler Group | The Tauri Group | USSpace, LLC |

| Monday, 4 January 2016 | | | | | | |
|---|---|---|---|---|---|---|
| 5-AA-1 | Aeroacoustics - Jet Noise I | | | | | Nautical |
| Chaired by: K. AHUJA, Georgia Institute of Technology and D. NARK, NASA Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-0001<br>**Mean Velocity and Turbulence Measurements of Supersonic Jets with Fluidic Inserts**<br>R. Powers, S. Hromisin, D. McLaughlin, P. Morris, Pennsylvania State University, University Park, PA | 0930 hrs<br>AIAA-2016-0002<br>**Numerical Investigation of Supersonic Jet Noise Suppression via Downstream Microjet Fluidic Injection**<br>H. Pourhashem, NYU Polytechnic School of Engineering, Brooklyn, NY; I. Kalkhoran, NYU Tandon School of Engineering, Brooklyn, NY | 1000 hrs<br>AIAA-2016-0003<br>**Fluctuating Pressure Gradients in Heated Supersonic Jets**<br>K. Lowe, Virginia Polytechnic Institute and State University, Blacksburg, VA; C. Nelson, Innovative Technology Applications Company, LLC, Chesterfield, MO | 1030 hrs<br>AIAA-2016-0004<br>**Extracting Near-Field Structures Related to Noise Production in High Speed Jets**<br>P. Kan, J. Lewalle, M. Glauser, Syracuse University, Syracuse, NY; S. Gogeneni, Spectral Energies, LLC, Dayton, OH; B. Kiel, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1100 hrs<br>AIAA-2016-0005<br>**Scale-specific Intermittency and Spatio-temporal Correlations in a Supersonic Jet**<br>U. Sasidharan Nair, L. Agostini, D. Gaitonde, Ohio State University, Columbus, OH | 1130 hrs<br>AIAA-2016-0006<br>**Including Finite Surface Span Effects in Empirical Jet-Surface Interaction Noise Models**<br>C. Brown, NASA Glenn Research Center, Cleveland, OH | |

| Monday, 4 January 2016 | | | | | | |
|---|---|---|---|---|---|---|
| **6-ABPSI-1/GEPC-1** | **NASA ERA Systems Integration I** | | | | | **Golden Hill B** |
| Chaired by: L. LEAVITT, N A S A and K. JAMES | | | | | | |
| 0900 hrs<br>AIAA-2016-0007<br>**Overview Of ERA Integrated Technology Demonstration (ITD) 51A Ultra-High Bypass (UHB) Integration for Hybrid Wing Body (HWB) (Invited)**<br>J. Flamm, NASA Langley Research Center, Hampton, VA; K. James, NASA Ames Research Center, Moffett Field, CA; J. Bonet, The Boeing Company, Huntington Beach, CA | 0930 hrs<br>Oral Presentation<br>**Summary of the Configuration Development of the BWB-009H1 Concept Vehicle for ERA Integrated Technology Demonstration (ITD) 51A Ultra-High Bypass (UHB) Integration for Hybrid Wing Body (HWB) (Invited)**<br>J. Bonet, N. Princen, The Boeing Company, Huntington Beach, CA; D. Roman, The Boeing Company, Long Beach, CA | 1000 hrs<br>AIAA-2016-0008<br>**Wind Tunnel Model Design and Fabrication of a 5.75% Scale Blended-Wing-Body Twin Jet Configuration (Invited)**<br>E. Dickey, N. Princen, J. Bonet, G. Ige, The Boeing Company, Huntington Beach, CA | 1030 hrs<br>AIAA-2016-0009<br>**Overview of Low-speed Aerodynamic Tests on a 5.75% Scale Blended-Wing-Body Twin Jet Configuration (Invited)**<br>D. Vicroy, NASA Langley Research Center, Hampton, VA; E. Dickey, N. Princen, M. Beyar, The Boeing Company, Huntington Beach, CA | 1100 hrs<br>AIAA-2016-0010<br>**Experimental Evaluation of Inlet Distortion on an Ejector Powered Hybrid Wing Body at Take-off and Landing Conditions (Invited)**<br>M. Carter, P. Shea, J. Flamm, NASA Langley Research Center, Hampton, VA; M. Schuh, K. James, NASA Ames Research Center, Moffett Field, CA; M. Sexton, The Boeing Company, Huntington Beach, CA; et al. | 1130 hrs<br>AIAA-2016-0011<br>**Turbine Powered Simulator Calibration and Testing for Hybrid Wing Body Powered Airframe Integration (Invited)**<br>K. Long, NASA Ames Research Center, Moffett Field, CA; P. Shea, J. Flamm, NASA Langley Research Center, Hampton, VA; D. Tompkins, M. Beyar, The Boeing Company, Huntington Beach, CA | 1200 hrs<br>AIAA-2016-0012<br>**Phased Acoustic Array Measurements of a 5.75% Hybrid Wing body Aircraft (Invited)**<br>N. Burnside, W. Horne, NASA Ames Research Center, Moffett Field, CA; K. Elmer, R. Cheng, L. Brusniak, The Boeing Company, Huntington Beach, CA |

| Monday, 4 January 2016 | | | | | | |
|---|---|---|---|---|---|---|
| **7-AFM-1** | **Biometric Flight Mechanics** | | | | | **Cortez Hill A** |
| Chaired by: R. LIND, University of Florida and M. XIN, University of Missouri | | | | | | |
| 0900 hrs<br>AIAA-2016-0013<br>**The Dynamics of Passive Wing-Pitching in Hovering Flight of Flapping Micro Air Vehicles Using Three-Dimensional Aerodynamic Simulations**<br>L. Chang, N. Perez-Arancibia, University of Southern California, Los Angeles, CA | 0930 hrs<br>AIAA-2016-0014<br>**Aerodynamic Model Identification of a Clap-and-Fling Flapping-Wing MAV: a Comparison between Quasi-steady and Black-box Approaches**<br>S. Armanini, J. Caetano, C. de Visser, G. de Croon, M. Mulder, Delft University of Technology, Delft, The Netherlands | 1000 hrs<br>AIAA-2016-0015<br>**Effect of Unsteady Aerodynamics on the Trim of Hovering Insects and FWMAVs**<br>A. Mouy, French Air Force Academy, Salon de Provence, France; A. Rossi, ENSMA, Chasseneuil-du-Poitou, France; H. Taha, University of California, Irvine, Irvine, CA | 1030 hrs<br>AIAA-2016-0016<br>**Dynamic Stability of a Hawkmoth-scale Flapping-wing Micro Air Vehicle during Forward Flight**<br>J. Kim, J. Han, S. Choi, J. Han, Korea Advanced Institute of Science and Technology, Daejeon, South Korea | 1100 hrs<br>AIAA-2016-0017<br>**Minimum-Time Transition of FWMAVs from Hovering to Forward Flight**<br>A. Hussein, Virginia Polytechnic Institute and State University, Blacksburg, VA; H. Taha, University of California, Irvine, Irvine, CA | 1130 hrs<br>AIAA-2016-0018<br>**Effects of Advance Ratio on the Aerodynamic Characteristics of an Insect Wing in Forward Flight**<br>J. Han, J. Han, Korea Advanced Institute of Science and Technology, Daejeon, South Korea ; J. Chang, Korea Aerospace University, Goyang, South Korea | 1200 hrs<br>Oral Presentation<br>**Systems level analysis of resonant mechnisms for flapping-wing flyers**<br>J. Kok, University of South Australia, Mawson Lakes, Australia; J. Chahl, Defence Science and Technology Organisation, Edinburgh, Australia |

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| **8-AFM-2** | **Atmospheric Entry, Hypersonic Flight and Aeroassist Technology I** | | | | | **Cortez Hill B** |
| Chaired by: M. BOLENDER, Air Force Research Lab and T. BERGER, US Army Aviation Development Directorate-AFDD | | | | | | |
| 0900 hrs<br>AIAA-2016-0019<br>**High Mass Mars Exploration using Slender Entry Vehicles**<br>K. Mall, M. Grant, Purdue University, West Lafayette, IN | 0930 hrs<br>AIAA-2016-0020<br>**Incorporation of Ablative Shape Change into Conceptual Hypersonic Mission Design**<br>H. Saranathan, M. Grant, Purdue University, West Lafayette, IN | 1000 hrs<br>AIAA-2016-0021<br>**Strategies for Landing Large Ballistic Coefficient Vehicles on Mars**<br>T. Anderson, Z. Putnam, R. Braun, Georgia Institute of Technology, Atlanta, GA | 1030 hrs<br>AIAA-2016-0022<br>**Stability Analysis of Multibody Systems for Mars Descent and Landing**<br>E. Mooij, Delft University of Technology, Delft, The Netherlands | 1100 hrs<br>AIAA-2016-0023<br>**Robust Aerial Deployment of Mars Airplane with Tilted Folding-Axis**<br>K. Fujita, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; H. Nagai, Tohoku University, Sendai, Japan; A. Oyama, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan | 1130 hrs<br>AIAA-2016-0024<br>**Application of Taylor Series Integration to Reentry Problems**<br>M. Bergsma, E. Mooij, Delft University of Technology, Delft, The Netherlands | |

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| **9-AMT-1** | **Velocimetry I** | | | | | **Balboa B** |
| Chaired by: D. PLEMMONS, Aerospace Testing Alliance (ATA) and T. ECKER, Virginia Tech | | | | | | |
| 0900 hrs<br>AIAA-2016-0025<br>**100-kHz burst-mode particle image velocimetry: space-time correlations and considerations for spatial and temporal resolution**<br>J. Miller, Air Force Research Laboratory, Wright-Patterson AFB, OH; N. Jiang, D. Thul, M. Slipchenko, J. Mance, Spectral Energies, LLC, Dayton, OH; T. Meyer, Purdue University, West Lafayette, IN; et al. | 0930 hrs<br>AIAA-2016-0026<br>**Velocity Measurements in an Arcjet Erosion Test Facility**<br>D. Plemmons, N. Galyen, E. Smith, R. Porter, Arnold Engineering Development Center, Arnold AFB, TN | 1000 hrs<br>AIAA-2016-0027<br>**Particle Image Velocimetry for Transonic Unsteady Flow Field around a Rocket Fairing Model**<br>S. Koike, K. Nakakita, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; S. Tsutsumi, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan | 1030 hrs<br>AIAA-2016-0028<br>**Towards shear flow measurements using FLEET**<br>Y. Zhang, N. Calvert, A. Dogariu, R. Miles, Princeton University, Princeton, NJ | 1100 hrs<br>AIAA-2016-0029<br>**Scale-up of the Time-Resolved Doppler Global Velocimetry Technique**<br>T. Ecker, K. Lowe, W. Ng, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1130 hrs<br>AIAA-2016-0030<br>**Velocity Spectrum Estimation in Shock–Boundary Layer Interaction**<br>T. Jiang, A. Schreyer, French Space Agency (CNES), Paris, France; L. Larchevêque, S. Piponniau, Aix-Marseille University, Marseille, France; D. Pierre, National Center for Scientific Research (CNRS), Marseille, France | |

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| **10-AMT-10/SD-15** | **Advances in Fluid-Structural Interaction Experimentation** | | | | | **Coronado D** |
| Chaired by: J. WAGNER, Sandia National Laboratories and T. BEBERNISS | | | | | | |
| 0900 hrs<br>Oral Presentation<br>**Advancements and Experimental Measurement Challenges of Shock-Boundary Layer Interaction Influence on the Dynamic Response of a Flexible Panel**<br>T. Beberniss, Air Force Research Laboratory, Wright-Patterson AFB, OH | 0930 hrs<br>Oral Presentation<br>**Optical Full-field Response Verification of Wind Tunnel Tests on Inflatable Aerodynamic Decelerators**<br>A. Calomino, K. Johnson, M. Cheatwood, NASA Langley Research Center, Hampton, VA; A. Cassell, G. Swanson, C. Kazemba, NASA Ames Research Center, Moffett Field, CA | 1000 hrs<br>Oral Presentation<br>**High-Speed Fluid-Structure Interaction Experiments at Sandia National Laboratories**<br>K. Casper, J. Wagner, S. Beresh, J. Henfling, R. Spillers, Sandia National Laboratories, Albuquerque, NM | 1030 hrs<br>Oral Presentation<br>**Simultaneous time-resolved PIV, and force measurements of membrane wings**<br>B. Ganapathisubramani, University of Southampton, Southampton, United Kingdom | 1100 hrs<br>Oral Presentation<br>**Structural Response to Fluid/ Acoustic Coupling**<br>N. Murray, University of Mississippi, University, MS | 1130 hrs<br>Oral Presentation<br>**Digital image correlation used for dynamic full-field deformation and strain measurements: Examples and applications**<br>P. Reu, Sandia National Laboratories, Albuquerque, NM | 1200 hrs<br>Oral Presentation<br>**FSI measurements of nuclear fuel bundles during earthquakes**<br>P. Bardet, N. Weichselbaum, S. Hussain, George Washington University, Washington, D.C. |

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| **11-APA-2** | **Special Session: Simulation of Rotor in Hover I** | | | | | **Coronado E** |
| Chaired by: N. HARIHARAN, CREATE-AV and R. NARDUCCI, Boeing Defense, Space & Security | | | | | | |
| 0900 hrs<br>AIAA-2016-0031<br>**Helicopter Aerodynamic Modeling of S-76 Rotor with Tip-Shape Variations: Review of AIAA Standardized Hover Evaluations**<br>N. Hariharan, CREATE AV Team, Lorton, VA; R. Narducci, The Boeing Company, Philadelphia, PA; T. Egolf, Sikorsky Aircraft Corporation, Stratford, CT | 0930 hrs<br>AIAA-2016-0032<br>**A Comparison of CFD Hover Predictions for the Sikorsky S-76 Rotor**<br>R. Jain, Army Research Development and Engineering Center, Moffett Field, CA | 1000 hrs<br>AIAA-2016-0033<br>**Assessment of S-76 Rotor Hover Performance in Ground Effect Using an Unstructured Mixed Mesh Method**<br>J. Hwang, J. Choi, O. Kwon, Korea Advanced Institute of Science and Technology, Daejeon, South Korea | 1030 hrs<br>AIAA-2016-0034<br>**Numerical simulation of Hovering S-76 Helicopter Rotor including Far-Field Analysis**<br>P. Gardarein, A. Le Pape, ONERA, Meudon, France | 1100 hrs<br>AIAA-2016-0035<br>**Direct Comparsion of Hover Prediction Workshop Results**<br>E. Duque, A. Toyoda, M. Burklund, Intelligent Light, Rutherford, NJ; N. Hariharan, CREATE AV Team, Patuxent River, MD; R. Narducci, The Boeing Company, Philadelphia, PA; C. Stone, Computational Science and Engineering, LLC, Chicago, IL | | |

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| **12-APA-3** | **Aerodynamic Testing: Flight and Large Scale** | | | | | **Americas Cup C** |
| Chaired by: S. MASSEY, NASA-Langley Research Center and M. PARK, NASA-Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-0036<br>**Flight Testing of FlexFloil™ Adaptive Compliant Trailing Edge**<br>S. Kota, FlexSys, Inc., Ann Arbor, MI; P. Flick, Air Force Research Laboratory, Wright-Patterson AFB, OH; F. Collier, NASA Langley Research Center, Hampton, VA | 0930 hrs<br>AIAA-2016-0037<br>**An Autonomous, Traversable Boundary-Layer Probe for Flight Testing**<br>H. Koch, P. Scholz, R. Kerbstadt, M. Wermes, Technical University of Braunschweig, Braunschweig, Germany | 1000 hrs<br>AIAA-2016-0038<br>**Evaluation of the Hinge Moment and Normal Force Aerodynamic Loads from a Seamless Adaptive Compliant Trailing Edge Flap in Flight**<br>E. Miller, J. Cruz, S. Lung, NASA Armstrong Flight Research Center, Edwards, CA; S. Kota, G. Ervin, K. Lu, FlexSys, Inc., Ann Arbor, MI; et al. | 1030 hrs<br>AIAA-2016-0039<br>**Measurements of Dynamic Interface Between Ship and Helicopter Air Wakes**<br>C. Friedman, George Washington University, Washington, D.C.; J. Duplessis, French Air Force Academy, Salon de Provence, France; M. Snyder, George Washington University, Washington, D.C. | 1100 hrs<br>AIAA-2016-0040<br>**Aerodynamic Tests Conducted on a Large Scale Nose Landing Gear and Cavity Model in the ARA Transonic Wind Tunnel**<br>D. Greenwell, A. Hill, Aircraft Research Association Ltd., Bedford, United Kingdom; M. Quinn, University of Manchester, Manchester, United Kingdom | 1130 hrs<br>AIAA-2016-0041<br>**High lift INflight VAlidation (HINVA) - Overview about the 2nd Flight Test Campaign**<br>R. Rudnik, German Aerospace Center (DLR), Braunschweig, Germany; D. Schwetzler, Airbus, Bremen, Germany | 1200 hrs<br>AIAA-2016-0042<br>**Determination of Power Required through Accelerated Flight with Application to Unmanned Vehicles**<br>L. Soltmann, C. Hall, North Carolina State University, Raleigh, NC |

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| **13-APA-4** | **Transonic & Supersonic Aerodynamics** | | | | | **Americas Cup D** |
| Chaired by: C. ROSEMA, US Army AMRDEC and M. FOSSATI, McGill University | | | | | | |
| 0900 hrs<br>AIAA-2016-0043<br>**Computation of High-Subsonic and Transonic Flows by a Lattice Boltzmann Method**<br>P. Gopalakrishnan, Y. Li, R. Zhang, H. Chen, Exa Corporation, Burlington, MA | 0930 hrs<br>AIAA-2016-0044<br>**Influence of transition on the flow downstream of normal shock wave--boundary layer interactions**<br>T. Davidson, H. Babinsky, University of Cambridge, Cambridge, United Kingdom | 1000 hrs<br>AIAA-2016-0045<br>**Large-Eddy Simulation of Shock-Induced Flow Separation Control Using SparkJet Concept**<br>G. Yang, Beihang University, Beijing, China; Y. Yao, University of the West of England, Bristol, United Kingdom; J. Fang, T. Gan, L. Lu, Beihang University, Beijing, China | 1030 hrs<br>AIAA-2016-0046<br>**Numerical Investigation of Supersonic Flow Over a Wall-Mounted Cylinder**<br>P. Morgan, Ohio Aerospace Institute, Dayton, OH; S. Sherer, M. Visbal, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1100 hrs<br>AIAA-2016-0047<br>**Investigation Of Diffusers For Two Stream Supersonic Wind Tunnels**<br>M. Prabakar, T. M. Thiruchengode, Indian Institute of Technology Madras, Chennai, India | | |

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| **14-FD-1/APA-5** | **Special Session: Low Re & Bio-inspired Flows Discussion Group (Invited)** | | | | | **Harbor E** |
| Chaired by: M. GREEN, Syracuse University | | | | | | |
| 0900 hrs<br>Oral Presentation<br>**Vortex dynamics around translating and pitching wings and fins**<br>K. Taira, Florida State University, Tallahassee, FL; M. Green, Syracuse University, Syracuse, NY | 0930 hrs<br>Oral Presentation<br>**Discrete-Vortex Method for Separated Flows, Augmented with Shedding Criteria from Boundary Layer Solutions**<br>K. Ramesh, University of Glasgow, Glasgow, United Kingdom | 1000 hrs<br>Oral Presentation<br>**Advances in Low-Dimensional Data-Driven Systems Modeling for Unsteady Nonlinear Aerodynamics**<br>M. Hemati, University of Minnesota, Minneapolis, Minneapolis, MN | 1030 hrs<br>Oral Presentation<br>**Applications of unsteady aerodynamic reduced-order models from experiments**<br>K. Granlund, North Carolina State University, Raleigh, NC | 1100 hrs<br>Oral Presentation<br>**Unsteady Separated Flow Associated with Cross-Flow Turbines**<br>B. Strom, B. Polagye, S. Brunton, University of Washington, Seattle, Seattle, WA | 1130 hrs<br>Discussion | |

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| **15-FD-2** | **Acoustics and Compressible Flow Transition** | | | | | **Promenade B** |
| Chaired by: R. KING, NASA-Langley Research Center and R. GOSSE, WPAFB | | | | | | |
| 0900 hrs<br>AIAA-2016-0048<br>**Acoustic Radiation from a Mach 14 Turbulent Boundary layer**<br>C. Zhang, L. Duan, Missouri University of Science and Technology, Rolla, MO | 0930 hrs<br>AIAA-2016-0049<br>**Numerical Study of Wave Trains in Supersonic Flow over a Compression Corner**<br>A. Novikov, A. Fedorov, Moscow Institute of Physics and Technology, Zhukovsky, Russia ; I. Egorov, TsAGI, Zhukovsky, Russia | 1000 hrs<br>AIAA-2016-0050<br>**Measurements in a Transitioning Cone Boundary Layer at Freestream Mach 3.5**<br>R. King, A. Chou, P. Balakumar, L. Owens, M. Kegerise, NASA Langley Research Center, Hampton, VA | 1030 hrs<br>AIAA-2016-0051<br>**Transient Growth Analysis of Compressible Boundary Layers with Parabolized Stability Equations**<br>P. Paredes, M. Choudhari, F. Li, C. Chang, NASA Langley Research Center, Hampton, VA | 1100 hrs<br>AIAA-2016-0052<br>**Effect of Freejet Upstream Flow Conditions on Flow-Acoustic Resonant Interactions in Transitional Airfoils**<br>L. Nguyen, V. Golubev, R. Mankbadi, Embry-Riddle Aeronautical University, Daytona Beach, FL; M. Roger, École Centrale de Lyon, Ecully, France; M. Visbal, Air Force Research Laboratory, Wright-Patterson AFB, OH | | |

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| **16-FD-3** | **Aerodynamic Flow Control** | | | | | **Cove** |
| Chaired by: J. LIN, NASA-Langley Research Center and D. WILLIAMS, Illinois Institute of Technology | | | | | | |
| 0900 hrs<br>AIAA-2016-0053<br>**Aerodynamic Control of Coupled Body-Wake Interactions**<br>T. Lambert, B. Vukasinovic, A. Glezer, Georgia Institute of Technology, Atlanta, GA | 0930 hrs<br>AIAA-2016-0054<br>**Separation Control With Cooperative Actuation**<br>M. Blechschmidt, K. Bauer, Airbus, Munich, Germany; W. Nitsche, Berlin Institute of Technology, Berlin, Germany | 1000 hrs<br>AIAA-2016-0055<br>**Investigation of Trapped Vorticity Concentrations Effected by Hybrid Actuation in an Offset Diffuser**<br>T. Burrows, Z. Gong, B. Vukasinovic, A. Glezer, Georgia Institute of Technology, Atlanta, GA | 1030 hrs<br>AIAA-2016-0056<br>**An Overview of Active Flow Control Enhanced Vertical Tail Technology Development**<br>J. Lin, M. Andino, M. Alexander, NASA Langley Research Center, Hampton, VA; E. Whalen, The Boeing Company, Hazelwood, MO; M. Spoor, J. Tran, The Boeing Company, Seattle, WA; et al. | 1100 hrs<br>AIAA-2016-0057<br>**Conical Forebody Flow Control Using Thick Dielectric Barrier Plasma Actuators**<br>Y. Long, H. Li, X. Meng, H. Hu, Northwestern Polytechnical University, Xi'an, China; F. Liu, S. Luo, University of California, Irvine, Irvine, CA | 1130 hrs<br>AIAA-2016-0058<br>**Modeling Dynamic Lift Response to Actuation**<br>X. An, D. Williams, Illinois Institute of Technology, Chicago, IL; J. Eldredge, University of California, Los Angeles, Los Angeles, CA; T. Colonius, California Institute of Technology, Pasadena, CA | |

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| **17-FD-4** | **CFD Applications and Design** | | | | | **Pier** |
| Chaired by: P. PERSSON | | | | | | |
| 0900 hrs<br>AIAA-2016-0059<br>**CFD Studies of Hybrid Air Vehicles**<br>M. Carrion, M. Biava, R. Steijl, G. Barakos, University of Liverpool, Liverpool, United Kingdom; D. Stewart, Hybrid Air Vehicles, Bedford, United Kingdom | 0930 hrs<br>AIAA-2016-0060<br>**Numerical Study of Water Impact of an Elastic Cylindrical Shell Using Coupled FVM-FEM Method**<br>Q. Qu, R. Wang, H. Guo, P. Liu, Beihang University, Beijing, China; R. Agarwal, Washington University in St. Louis, St. Louis, MO | 1000 hrs<br>AIAA-2016-0061<br>**Hybrid Quasi Molecular-Continuum Modeling of Supercooled Large Droplet Dynamics for In-flight Icing Conditions**<br>V. Abdollahi, W. Habashi, M. Fossati, McGill University, Montréal, Canada | 1030 hrs<br>AIAA-2016-0062<br>**Development of a Parallel Lagrangian Particle Tracking Code for 3D Multi-Block Curvilinear Grids**<br>A. Kulkarni, J. Edwards, North Carolina State University, Raleigh, NC | 1100 hrs<br>AIAA-2016-0063<br>**A Surface Vorticity Panel Method**<br>D. Pate, B. German, Georgia Institute of Technology, Atlanta, GA | 1130 hrs<br>AIAA-2016-0064<br>**High-Order, Time-Dependent Aerodynamic Optimization using a Discontinuous Galerkin Discretization of the Navier-Stokes Equations**<br>M. Zahr, Stanford University, Stanford, CA; P. Persson, University of California, Berkeley, Berkeley, CA | 1200 hrs<br>AIAA-2016-0065<br>**One-Dimensional Approach to Modeling of Reflected and Transmitted Pressure Pulses in Ducts**<br>M. Golbabaei-Asl, A. Povitsky, University of Akron, Akron, OH |

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| **18-FD-5** | **CFD: Time Integration and Preconditioning** | | | | | **Promenade A** |
| Chaired by: T. PULLIAM, NASA Ames Research Center and K. CASSEL, Illinois Institute of Technology | | | | | | |
| 0900 hrs<br>AIAA-2016-0066<br>**Towards Efficient Parallel-in-Time Simulation of Periodic Flows**<br>J. Leffell, Science and Technology Corporation, Moffett Field, CA; J. Sitaraman, Parallel Geometric Algorithms, LLC, Sunnyvale, CA; V. Lakshminarayan, Science and Technology Corporation, Moffett Field, CA; A. Wissink, Army Aviation and Missile Research Development and Engineering Center, Moffett Field, CA | 0930 hrs<br>AIAA-2016-0067<br>**Implicit Time Marching Methods for Large-Scale High-Accuracy Simulations of Compressible Flows**<br>Y. Du, J. Ekaterinaris, Embry-Riddle Aeronautical University, Daytona Beach, FL | 1000 hrs<br>AIAA-2016-0068<br>**Cost Effective Multi-Resolution Analysis Applied to Implicit Temporal Integration**<br>S. Chae, Pusan National University, Busan, South Korea ; H. Kang, Dongyang Mirae University, Seoul, South Korea ; S. Oh, Pusan National University, Busan, South Korea ; K. Yee, Seoul National University, Seoul, South Korea | 1030 hrs<br>AIAA-2016-0069<br>**Toward an Optimal Solver for Time-spectral Solutions on Unstructured Meshes**<br>N. Mundis, D. Mavriplis, University of Wyoming, Laramie, Laramie, WY | 1100 hrs<br>AIAA-2016-0070<br>**Finite Volume Implementation of the Harmonic Balance Method for Periodic Non-Linear Flows**<br>G. Cvijetic, University of Zagreb, Zagreb, Croatia; H. Jasak, Wikki, Ltd., London, United Kingdom; V. Vukcevic, University of Zagreb, Zagreb, Croatia | 1130 hrs<br>AIAA-2016-0071<br>**The Role of Dispersion and Dissipation on Stabilization Strategies for Time-Accurate Simulations**<br>A. Edoh, University of California, Los Angeles, Los Angeles, CA; N. Mundis, ERC Inc., Edwards AFB, CA; A. Karagozian, University of California, Los Angeles, Los Angeles, CA; V. Sankaran, Air Force Research Laboratory, Edwards AFB, CA | 1200 hrs<br>AIAA-2016-0072<br>**Highly-Accurate Filter-Based Artificial-Dissipation Schemes for Stiff Unsteady Fluid Systems**<br>N. Mundis, ERC Inc., Edwards AFB, CA; A. Edoh, University of California, Los Angeles, Los Angeles, CA; V. Sankaran, Air Force Research Laboratory, Edwards AFB, CA |

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| **19-FD-6** | **Shock Boundary Layer Interaction I** | | | | | **Harbor F** |
| Chaired by: N. BISEK, Air Force Reseach Laboratory and J. LITTLE, The University of Arizona | | | | | | |
| 0900 hrs<br>AIAA-2016-0073<br>**On the length and time scales of a laminar shock wave boundary layer interaction**<br>M. Diop, S. Piponniau, Aix-Marseille University, Marseille, France; D. Pierre, National Center for Scientific Research (CNRS), Marseille, France | 0930 hrs<br>AIAA-2016-0074<br>**Forced Navier-Stokes-based Analysis of Low-Frequency Dynamics in a Shock/Turbulent Boundary Layer Interaction**<br>M. Adler, D. Gaitonde, Ohio State University, Columbus, OH | 1000 hrs<br>AIAA-2016-0075<br>**An Experiment Investigation on Shock-induced Turbulent Boundary Layer Separation Flow-field**<br>X. Zhao, China Academy of Aerospace Aerodynamics, Beijing, China | 1030 hrs<br>AIAA-2016-0076<br>**Effect of Upstream Boundary Layer on Unsteadiness of Swept-Ramp Shock/Boundary Layer Interactions at Mach 2**<br>L. Vanstone, M. Saleem, S. Seckin, N. Clemens, University of Texas, Austin, Austin, TX | 1100 hrs<br>AIAA-2016-0077<br>**Shock Wave Boundary Layer Interaction Unsteadiness: The Effects of Configuration and Strength**<br>J. Threadgill, P. Bruce, Imperial College London, London, United Kingdom | 1130 hrs<br>AIAA-2016-0078<br>**Response of a shock train to downstream back pressure forcing**<br>R. Klomparens, J. Driscoll, M. Gamba, University of Michigan, Ann Arbor, Ann Arbor, MI | |

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| **20-GNC-1** | **Vehicle & Flight Control Validation** | | | | | **Hillcrest A** |
| Chaired by: K. WISE, Boeing Defense, Space & Security and A. NARANG-SIDDARTH, University of Washington | | | | | | |
| 0900 hrs<br>AIAA-2016-0079<br>**Geometric Nonlinear Controllability Analysis for Airplane Flight Dynamics**<br>A. Hassan, H. Taha, University of California, Irvine, Irvine, CA | 0930 hrs<br>AIAA-2016-0080<br>**Local Linear Controllability and Observability Analysis of Nonlinear Systems with Continuation Methods**<br>M. Spetzler, A. Narang-Siddarth, University of Washington, Seattle, Seattle, WA | 1000 hrs<br>AIAA-2016-0081<br>**Efficient Nonlinear Actuator Fault Reconstruction System**<br>P. Lu, E. Van Kampen, Q. Chu, Delft University of Technology, Delft, The Netherlands | 1030 hrs<br>AIAA-2016-0082<br>**The Influence of Control Surface Faults on Flexible Aircraft**<br>W. Fan, H. Liu, R. Kwong, University of Toronto, Toronto, Canada | 1100 hrs<br>AIAA-2016-0083<br>**Efficient Methods for Flight Envelope Estimation through Reachability Analysis**<br>J. Stapel, C. de Visser, E. Van Kampen, Q. Chu, Delft University of Technology, Delft, The Netherlands | 1130 hrs<br>AIAA-2016-0084<br>**Flight Testing of a Gain-Scheduled Stability and Control Augmentation System for a Quad-Tilt-Wing UAV**<br>H. Totoki, Y. Ochi, National Defense Academy, Yokosuka, Japan; M. Sato, K. Muraoka, Japan Aerospace Exploration Agency (JAXA), Mitaka, Japan | 1200 hrs<br>AIAA-2016-0085<br>**Piloted Simulator Evaluation of a Model-Independent Fault-Tolerant Flight Control System**<br>D. Tang, D. Pool, O. Stroosma, Q. Chu, C. de Visser, Delft University of Technology, Delft, The Netherlands |

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| **21-GNC-2** | **Spacecraft Attitude Control I** | | | | | **Hillcrest B** |
| Chaired by: J. LIU, Boeing Defense, Space & Security and J. THIENEL, NASA Goddard Space Flight Center | | | | | | |
| 0900 hrs<br>AIAA-2016-0086<br>**Spacecraft Attitude Stabilization using Magnetorquers with Separation between Measurement and Actuation**<br>F. Celani, University of Rome "La Sapienza", Rome, Italy | 0930 hrs<br>AIAA-2016-0087<br>**Design and Stability of an On-Orbit Attitude Control System Using Reaction Control Thrusters**<br>R. Hall, CRM Solutions, Inc., Huntsville, AL; S. Hough, Dynamic Concepts, Inc., Huntsville, AL; C. Orphee, NASA Marshall Space Flight Center, Huntsville, AL; K. Clements, ERC Inc., Huntsville, AL | 1000 hrs<br>AIAA-2016-0088<br>**Formulation of Torque-Optimal Guidance Trajectories for a CubeSat with Degraded Reaction Wheels**<br>S. Kedare, S. Ulrich, Carleton University, Ottawa, Canada | 1030 hrs<br>AIAA-2016-0089<br>**Simulation of Malfunctions for the ISS Double-Gimbal Control Moment Gyroscope**<br>R. Inampudi, Lockheed Martin Corporation, Houston, TX; J. Gordeuk, GHG Corporation, Webster, TX | 1100 hrs<br>AIAA-2016-0090<br>**Fault-Tolerant Architecture of Two Parallel Double-Gimbal Variable-Speed Control Moment Gyros**<br>T. Sasaki, T. Shimomura, Osaka Prefecture University, Sakai, Japan | 1130 hrs<br>AIAA-2016-0091<br>**Simulation of an Electromechanical Spin Motor System of a Control Moment Gyroscope**<br>R. Inampudi, Lockheed Martin Corporation, Houston, TX; J. Gordeuk, GHG Corporation, Webster, TX | |

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| **22-GNC-3** | **Invited Session: LOC-1, Onboard Systems for LOC Prevention and Recovery – Problem Analysis and Upset Prevention Methods** | | | | | **Coronado B** |
| Chaired by: C. BELCASTRO, NASA-Langley Research Center and D. CRIDER, National Transportation Safety Board | | | | | | |
| 0900 hrs<br>AIAA-2016-0092<br>**Aircraft Loss of Control: Problem Analysis for the Development and Validation of Technology Solutions**<br>C. Belcastro, J. Foster, NASA Langley Research Center, Hampton, VA; R. Newman, Crew Systems, Inc., Seattle, WA; L. Groff, D. Crider, National Transportation Safety Board, Washington, D.C.; D. Klyde, Systems Technology, Inc., Hawthorne, CA | 0930 hrs<br>AIAA-2016-0093<br>**Design and Piloted Simulator Evaluation of Adaptive Safe Flight Envelope Protection Algorithm**<br>T. Lombaerts, G. Looye, German Aerospace Center (DLR), Oberpfaffenhofen, Germany; J. Ellerbroek, M. Rodriguez y Martin, Delft University of Technology, Delft, The Netherlands | 1000 hrs<br>AIAA-2016-0094<br>**Flight Safety Assessment and Management to Prevent Loss of Control Due to In-Flight Icing**<br>S. Balachandran, E. Atkins, University of Michigan, Ann Arbor, Ann Arbor, MI | 1030 hrs<br>AIAA-2016-0095<br>**Pilot Perception Model Supports the Analysis of Vestibular Illusions in Flight Accidents**<br>E. Groen, J. Bos, M. Houben, TNO, Soesterberg, The Netherlands | 1100 hrs<br>AIAA-2016-0096<br>**Mathematical Multi-Sensory Model of Spatial Orientation**<br>B. McGrath, Embry-Riddle Aeronautical University, Daytona Beach, FL; B. Mortimer, Engineering Acoustics, Inc., Casselberry, FL; S. Drakunov, J. French, Embry-Riddle Aeronautical University, Daytona Beach, FL | 1130 hrs<br>AIAA-2016-0097<br>**A Computational Analysis of the Impact of Pilot Awareness of Control Surface Deflection on Expectation of Aircraft State**<br>L. Whitcher, A. Pritchett, A. Bozan, Georgia Institute of Technology, Atlanta, GA | |

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| **23-GNC-4** | **Invited Session: EDL-1, Entry, Descent and Landing GN&C Technology I** | | | | | **Coronado A** |
| Chaired by: J. CARSON, NASA Jet Propulsion Laboratory and R. SOSTARIC, NASA-Johnson Space Center | | | | | | |
| 0900 hrs<br>AIAA-2016-0098<br>**An Inertial Dual-State State Estimator for Precision Planetary Landing with Hazard Detection and Avoidance**<br>R. Bishop, University of South Florida, Tampa, FL; T. Crain, Intuitive Machines, Inc., Houston, TX; K. DeMars, Missouri University of Science and Technology, Rolla, MO; C. Hanak, Intuitive Machines, Inc., Houston, TX; J. Carson, N. Trawny, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; et al. | 0930 hrs<br>AIAA-2016-0099<br>**Approach-Phase Precision Landing with Hazard Relative Navigation: Terrestrial Test Campaign Results of the Morpheus/ALHAT Project**<br>T. Crain, Intuitive Machines, Inc., Houston, TX; R. Bishop, University of South Florida, Tampa, FL; J. Carson, N. Trawny, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; J. Sullivan, NASA Johnson Space Center, Houston, TX; J. Christian, West Virginia University, Morgantown, WV; et al. | 1000 hrs<br>AIAA-2016-0100<br>**GN&C Subsystem Concept for Safe Precision Landing of the Proposed Lunar MARE Robotic Science Mission**<br>J. Carson, NASA Johnson Space Center, Houston, TX; A. Johnson, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; G. Hines, NASA Langley Research Center, Hampton, VA; W. Johnson, NASA Johnson Space Center, Houston, TX; F. Anderson, Southwest Research Institute, Boulder, CO; S. Lawrence, Arizona State University, Tempe, AZ; et al. | 1030 hrs<br>AIAA-2016-0101<br>**Flyover Modeling of Planetary Pits**<br>A. Balakumar, N. Bhasin, O. Daids, R. Shanor, K. Snyder, W. Whittaker, Carnegie Mellon University, Pittsburgh, PA | 1100 hrs<br>AIAA-2016-0102<br>**Maraia Capsule Flight Testing and Results for Entry, Descent, and Landing (EDL)**<br>A. Strahan, R. Sostaric, NASA Johnson Space Center, Houston, TX | | |

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| **24-GNC-5** | **Aerospace Robotics and Unmanned/Autonomous Systems I** | | | | | **Hillcrest C** |
| Chaired by: M. AKELLA, University of Texas at Austin and S. ULRICH, Carleton University | | | | | | |
| 0900 hrs<br>AIAA-2016-0103<br>**Modeling and Attitude Control of Tri-Tilt Ducted Fan Vehicle**<br>Y. Seo, Y. Kim, Seoul National University, Seoul, South Korea | 0930 hrs<br>AIAA-2016-0104<br>**Three Dimensional Optimum Path Calculation for Autonomous Parafoil Vehicles in High Altitude Ballooning**<br>S. Lee, Alfred University, Alfred, NY; J. Conner, A. Arena, Oklahoma State University, Stillwater, OK | 1000 hrs<br>AIAA-2016-0105<br>**An Improved Model-Based Observer for Inertial Navigation for Quadrotors with Low Cost IMUs.**<br>D. Hanley, T. Bretl, University of Illinois, Urbana-Champaign, Urbana, IL | 1030 hrs<br>AIAA-2016-0106<br>**Characterization of Flow Field Divergence for MAVs Vertical Control Landing**<br>H. Ho, G. de Croon, Delft University of Technology, Delft, The Netherlands | 1100 hrs<br>AIAA-2016-0107<br>**Nonlinear Control of a Fixed-Wing UAV using Support Vector Machine**<br>S. Bhandari, Y. Lu, A. Raheja, D. Tang, California Polytechnic State University, Pomona, CA | | |

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| **25-GT-1** | **SAMURAI - Testing and Simulation of Real Engine Flows I (Invited)** | | | | | **Harbor I** |
| Chaired by: J. QUEST, ETW GmbH and B. MILLS, AEDC/ ATA | | | | | | |
| 0900 hrs<br>AIAA-2016-0108<br>**Flow field investigations in the free bypass jet flow of a V2527 engine at Ground Operation using SPIV**<br>A. Schroeder, R. Geisler, D. Schanz, B. Wrede, J. Agocs, German Aerospace Center (DLR), Göttingen, Germany | 0930 hrs<br>AIAA-2016-0109<br>**Large-scale density gradient visualization of the V2527 engine jet flow at Ground Operation using BOS**<br>R. Geisler, A. Schroeder, D. Schanz, J. Agocs, German Aerospace Center (DLR), Göttingen, Germany | 1000 hrs<br>AIAA-2016-0110<br>**SAMURAI - jet noise source analysis of a V2500 engine**<br>H. Siller, A. Bassetti, S. Funke, German Aerospace Center (DLR), Berlin, Germany | 1030 hrs<br>AIAA-2016-0111<br>**Aerodynamic Performance Characteristics of the Installed V2527 Fan at Ground Operation**<br>D. Schönweitz, R. Becker, P. Ebel, R. Schnell, M. Schroll, German Aerospace Center (DLR), Cologne, Germany | 1100 hrs<br>AIAA-2016-0112<br>**Correlation analysis between the jet exhaust velocity and microphone-array acoustic measurements for a turbo-fan engine**<br>A. Bassetti, T. Berkefeld, A. Schroeder, H. Siller, B. Wrede, German Aerospace Center (DLR), Berlin, Germany | | |

| Monday, 4 January 2016 | | | | | | |
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| **26-GTE-1** | **Turbine Technologies** | | | | | **Gaslamp D** |
| Chaired by: G. WELCH, NASA Glenn Research Center and J. EBACHER, Rolls-Royce | | | | | | |
| 0900 hrs<br>AIAA-2016-0113<br>**The Effect of Profile Contouring on Secondary Flow Structures in Low Pressure Turbines**<br>P. Bear, M. Wolff, Wright State University, Dayton, OH; C. Marks, R. Sondergaard, Air Force Research Laboratory, Wright-Patterson AFB, OH | 0930 hrs<br>AIAA-2016-0114<br>**Reynolds Number Effects on the Secondary Flow of Profile Contoured Low Pressure Turbines**<br>C. Marks, R. Sondergaard, Air Force Research Laboratory, Wright-Patterson AFB, OH; P. Bear, M. Wolff, Wright State University, Dayton, OH | 1000 hrs<br>AIAA-2016-0115<br>**Three Dimensional Turbine Blade Optimization Using Evolutionary Algorithm with Viscous Flow Analysis**<br>C. Thorn, R. Hartfield, Auburn University, Auburn, AL | 1030 hrs<br>AIAA-2016-0116<br>**Flow Disturbance Environment in Low Pressure Turbines**<br>J. Cui, P. Tucker, University of Cambridge, Cambridge, United Kingdom | 1100 hrs<br>AIAA-2016-0117<br>**Effects of Modeled Stator Wake on a Low Pressure Turbine Blade Dynamic Performance**<br>J. Masud, U. Safdar, O. Khan, S. Ahmed, Air University, Islamabad, Pakistan | | |

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| **27-GTE-2** | **Cycles and Auxiliary Systems** | | | | | **Harbor H** |
| Chaired by: J. TAI, Georgia Institute of Technology and G. PANIAGUA, Purdue University | | | | | | |
| 0900 hrs<br>AIAA-2016-0118<br>**Micro-Gas Turbine Thrust Enhancement via Flow Angularity Corrections**<br>N. Kidder, A. Motsinger, K. Ruff, B. Jackson, B. Novitsky, Ohio State University, Columbus, OH | 0930 hrs<br>AIAA-2016-0119<br>**Meanline Analysis of Turbines with Choked Flow in the Object-Oriented Turbomachinery Analysis Code**<br>E. Hendricks, NASA Glenn Research Center, Cleveland, OH | 1000 hrs<br>AIAA-2016-0120<br>**Development and Testing of a Fuzzy Logic Controller for a Small Turbojet Engine**<br>S. Ekinci, S. Usenmez, Aerotim Engineering, LLC, Ankara, Turkey; I. Yavrucuk, O. Uzol, Middle East Technical University, Ankara, Turkey | 1030 hrs<br>AIAA-2016-0121<br>**Expected Performance of a Jetcat P200 as a Gas Generator**<br>N. Grannan, J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; S. Bailie, F. Schauer, Air Force Research Laboratory, Wright-Patterson AFB, OH | | | |



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| **28-HSABP-1** | **Advances in Pressure Gain Combustion I - RDE & PDE** | | | | | **Harbor B** |
| Chaired by: D. PAXSON, NASA Glenn Research Center and K. KAILASANATH, Naval Research Laboratory | | | | | | |
| 0900 hrs<br>AIAA-2016-0122<br>**Experimental Performance Evaluation of 3N-Class Pulse Detonation Thruster using Liquid Purge Method**<br>S. Takagi, K. Hosono, K. Matsuoka, J. Kasahara, Nagoya University, Nagoya, Japan; A. Matsuo, Keio University, Tokyo, Japan; I. Funaki, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan | 0930 hrs<br>AIAA-2016-0123<br>**Development of High-Frequency Pulse Detonation Combustor without Purging Material**<br>K. Muto, K. Matsuoka, J. Kasahara, Nagoya University, Nagoya, Japan; H. Watanabe, A. Matsuo, Keio University, Yokohama, Japan; T. Endo, Hiroshima University, Higashi-Hiroshima, Japan | 1000 hrs<br>AIAA-2016-0124<br>**Hollow Rotating Detonation Combustor**<br>V. Ganesh Kumar, A. St. George, E. Gutmark, University of Cincinnati, Cincinnati, OH | 1030 hrs<br>AIAA-2016-0125<br>**High Fidelity Simulations of a Non-Premixed Rotating Detonation Engine**<br>P. Cocks, A. Holley, United Technologies Corporation, East Hartford, CT; B. Rankin, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1100 hrs<br>AIAA-2016-0126<br>**Starting Transients and Detonation Onset Behavior in a Rotating Detonation Combustor**<br>A. St. George, R. Driscoll, V. Ganesh Kumar, E. Gutmark, University of Cincinnati, Cincinnati, OH | 1130 hrs<br>AIAA-2016-0127<br>**Design of a Premixed Fuel-Oxidizer System to Prevent Flashback in a Rotating Detonation Engine**<br>I. Andrus, P. King, M. Polanka, Air Force Institute of Technology, Wright-Patterson AFB, OH; F. Schauer, Air Force Research Laboratory, Wright-Patterson AFB, OH; J. Hoke, Innovative Scientific Solutions, Inc., Centerville, OH | 1200 hrs<br>AIAA-2016-0128<br>**Experimental Validation of Expanded Centerbodiless RDE Design**<br>W. Stoddard, A. St. George, R. Driscoll, V. Ganesh Kumar, E. Gutmark, University of Cincinnati, Cincinnati, OH |

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| **29-IS-1/ICC-1/DA-1** | **Student Paper Competition -- Information Systems Group** | | | | | **Regatta B** |
| Chaired by: M. SOTAK and T. YUCELEN, Missouri University of Science & Technology | | | | | | |
| 0900 hrs<br>AIAA-2016-0129<br>**Intent-based Abstraction for Formal Verification of Flight Deck Mode Confusion**<br>J. Suraj Nandiganahalli, S. Lee, I. Hwang, Purdue University, West Lafayette, IN | 0930 hrs<br>AIAA-2016-0130<br>**Belief Space Hierarchical Planning in the Now for Unmanned Aerial Vehicles**<br>C. Moses, Northeastern University, Boston, MA; R. Chipalkatty, Draper Laboratory, Cambridge, MA | 1000 hrs<br>AIAA-2016-0131<br>**Incremental Scheduling with Upper and Lowerbound Temporospatial Constraints**<br>G. Sturla, M. Gombolay, J. Shah, Massachusetts Institute of Technology, Cambridge, MA | 1030 hrs<br>AIAA-2016-0132<br>**Simple Adaptive Control with PID for MIMO Fault Tolerant Flight Control Design**<br>T. Nishiyama, S. Suzuki, University of Tokyo, Bunkyo, Japan; M. Sato, K. Masui, Japan Aerospace Exploration Agency (JAXA), Mitaka, Japan | 1100 hrs<br>AIAA-2016-0133<br>**Combined Flight Management System and Flight Data Recorder for General Aviation using Tablet Computers**<br>J. Adams, C. Merrett, Carleton University, Ottawa, Canada | | |

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| **30-ISC-1** | **International Student Conference - Undergraduate Category** | | | | | **Torrey Hills A** |
| Chaired by: L. HANSEN, HRP Systems, Inc. | | | | | | |
| 0900 hrs<br>AIAA-2016-0134<br>**Dynamic Impact Response and Simulation of Intrumented Projectile using Bond-Based Peridynamics**<br>T. Buckley, Michigan State University, East Lansing, MI | 0930 hrs<br>AIAA-2016-0135<br>**Improved Digital Holographic Interferometry for Two-Dimensional Plasma Density Measurements**<br>E. Forbes, University of Washington, Seattle, Seattle, WA | 1000 hrs<br>AIAA-2016-0136<br>**Correlation-based Depth Estimation with a Plenoptic Camera**<br>W. Roberts, B. Thurow, Auburn University, Auburn, AL | 1030 hrs<br>AIAA-2016-0137<br>**Investigation of the Effect of Blade Kinematics and Reynolds Number on the Aerodynamic Performance of a Small-Scale Vertical Axis Wind Turbine with Dynamic Blade Pitching**<br>A. Mills, University of Maryland, College Park, College Park, MD; M. Benedict, Texas A&M University, College Station, TX; I. Chopra, University of Maryland, College Park, College Park, MD | 1100 hrs<br>AIAA-2016-0138<br>**Aerodynamic Evaluation of the NASA Microgravity Unmanned Aerial Vehicle**<br>J. Castagnetta, R. Larson, U.S. Air Force Academy, Colorado Springs, CO | 1130 hrs<br>AIAA-2016-0139<br>**Preliminary Evaluation of an Electromyographically Controlled Quadrotor**<br>A. Azocar, Texas A&M University, College Station, TX | 1200 hrs<br>AIAA-2016-0140<br>**Dynamic Coupling Effects on Twin Supersonic Impinging Jets**<br>M. Wong, Monash University, Melbourne, Australia |

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| **31-ISC-2** | **International Student Conference - Masters Category** | | | | | **Torrey Hills B** |
| Chaired by: J. CORBETS | | | | | | |
| 0900 hrs<br>AIAA-2016-0141<br>**Design and Fabrication of a Meso-scale Aircraft using a Cycloidal Rotor Propulsion System**<br>G. Andrews, E. Shrestha, I. Chopra, University of Maryland, College Park, College Park, MD | 0930 hrs<br>AIAA-2016-0142<br>**On Steady Trkalian High Speed Flows: Swirling Compressible Motion in Solid Rocket Motors**<br>O. Cecil, J. Majdalani, Auburn University, Auburn, AL | 1000 hrs<br>AIAA-2016-0143<br>**Development of Rate Gyroscope Characterization Tools with Application to Helium Exposure Testing**<br>E. Hilgemann, H. Ruch, J. Cutler, University of Michigan, Ann Arbor, Ann Arbor, MI | 1030 hrs<br>AIAA-2016-0144<br>**On the Development of a Robotic Hummingbird**<br>D. Coleman, M. Benedict, Texas A&M University, College Station, TX | 1100 hrs<br>AIAA-2016-0145<br>**Discrete-time Modified State Observer Implementation on a Two Wheeled Inverted Pendulum Robot**<br>J. Stumfoll, Missouri University of Science and Technology, Rolla, MO | 1130 hrs<br>AIAA-2016-0146<br>**Experimental Investigation of Dynamic Stall on Pliant Wings for Micro Air Vehicles**<br>N. Osterberg, Oregon State University, Corvallis, OR | 1200 hrs<br>AIAA-2016-0147<br>**Beyond Nyquist by Pouring Space into Time**<br>J. Schneiders, R. Dwight, F. Scarano, Delft University of Technology, Delft, The Netherlands |

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| **32-LEC-1**<br>**0900 - 1000 hrs** | **NDA Lecture** | **Harbor A** |

*A Bayesian Framework for Assessment of Model Uncertainty*
**Armen Der Kiureghian**
President, American University of Armenia
Taisei Professor of Civil Engineering Emeritus, University of California, Berkeley

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| **33-MAT-1** | **Nanostructured Materials I** | | | | | **Gaslamp B** |
| Chaired by: B. BHAT, NASA Marshall Space Flight Center and S. ROY, The University of Alabama and G. ODEGARD | | | | | | |
| 0900 hrs<br>AIAA-2016-0148<br>**Structure-Process-Property Study of Aligned Carbon Nanotube Interlaminar Reinforcement in Woven Carbon Fiber Prepreg Laminate**<br>E. Kalfon-Cohen, D. Lewis, Massachusetts Institute of Technology, Cambridge, MA; J. Ravine, National Composites Center, Kettering, OH; B. Wardle, Massachusetts Institute of Technology, Cambridge, MA | 0930 hrs<br>AIAA-2016-0149<br>**Woven Hierarchical Aerospace Composite Laminates with Aligned Carbon Nanotube Bulk Reinforcement**<br>R. Li, E. Antunes, A. Liotta, C. Parschau, M. Payne, B. Wardle, Massachusetts Institute of Technology, Cambridge, MA | 1000 hrs<br>AIAA-2016-0150<br>**Nanoparticle Alignment using Oscillating Magnetic Fields for Scalable Nanocomposite Manufacturing**<br>M. Spencer, N. Yamamoto, Pennsylvania State University, University Park, PA | 1030 hrs<br>AIAA-2016-0151<br>**Influence of Waviness on the Elastic Properties of Aligned Carbon Nanotube Polymer Matrix Nanocomposites**<br>I. Stein, B. Wardle, Massachusetts Institute of Technology, Cambridge, MA | 1100 hrs<br>AIAA-2016-0152<br>**Thermal conductivity via atomistic modeling for epoxy-SWNT composites**<br>N. Fasanella, V. Sundararaghavan, University of Michigan, Ann Arbor, MI | 1130 hrs<br>AIAA-2016-0153<br>**Mode I Fracture Toughness of Aligned Carbon Nanotube Epoxy Nanocomposites**<br>D. Lidston, C. Parschau, C. Chappelle, D. Lewis, B. Wardle, Massachusetts Institute of Technology, Cambridge, MA | 1200 hrs<br>AIAA-2016-0154<br>**Non-covalent Functionalization of CNT and Graphene and Its Application to Hybrid Carbon/Epoxy Composites**<br>A. Avila, V. Munhoz, A. Oliveira, N. Menezes, Federal University of Minas Gerais, Belo Horizonte, Brazil; S. Leao, University Center Newton Paiva, Belo Horizonte, Brazil; C. Silva, Federal University of Minas Gerais, Belo Horizonte, Brazil |

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| **34-MAT-2** | **Fatigue & Fracture I** | | | | | **Gaslamp C** |
| Chaired by: R. FERTIG, University of Wyoming and G. SEIDEL, Virginia Polytechnic Institute and State Universit | | | | | | |
| 0900 hrs<br>AIAA-2016-0155<br>**Multiscale Modeling of Effective Piezoresistivity in Nanocomposite Bounded Explosives**<br>A. Chaurasia, G. Seidel, Virginia Polytechnic Institute and State University, Blacksburg, VA | 0930 hrs<br>AIAA-2016-0156<br>**Utilization of a Linear Solver for Multiscale Design and Optimization of Microstructures in an Airframe Panel Buckling Problem**<br>P. Acar, V. Sundararaghavan, University of Michigan, Ann Arbor, MI | 1000 hrs<br>AIAA-2016-0157<br>**High-energy hydroforming for the aerospace industry**<br>S. Van Der Veen, L. Barcenas, Airbus, Toulouse, France; H. Groeneveld, V. Bhoelai, 3D Metal Forming, Lelystad, The Netherlands ; J. Sinke, Delft University of Technology, Delft, The Netherlands | | | | |

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| **35-MDO-1** | **Aero & Structural Technology Investigations** | | | | | **Balboa A** |
| Chaired by: J. GRAY, NASA Glenn Research Center and S. CHOI, Virginia Polytechnic Institute and State University | | | | | | |
| 0900 hrs<br>AIAA-2016-0158<br>**Flight Vehicle Structural Design Processes for a Common Bulkhead and an MPCV Spacecraft Adapter**<br>P. Aggarwal, P. Hull, NASA Marshall Space Flight Center, Huntsville, AL | 0930 hrs<br>AIAA-2016-0159<br>**Performance Evaluation of a Morphing Trailing Edge Using Multipoint Aerostructural Design Optimization**<br>D. Burdette, G. Kenway, J. Martins, University of Michigan, Ann Arbor, Ann Arbor, MI | 1000 hrs<br>AIAA-2016-0160<br>**Aerostructural Optimization of a Low Sweep Transonic Wing with Shock Control Bump**<br>A. Elham, B. Timmer, Delft University of Technology, Delft, The Netherlands | 1030 hrs<br>AIAA-2016-0161<br>**Cure Rate Tailoring of Thick Composites Via Temperature Controlled Vascular Pathways**<br>M. O'Donnell, Y. Mahadik, C. Ward, University of Bristol, Bristol, United Kingdom | 1100 hrs<br>AIAA-2016-0162<br>**Co-Design of Strain-Actuated Solar Arrays for Precision Pointing and Jitter Reduction**<br>C. Chilan, D. Herber, Y. Nakka, S. Chung, J. Allison, University of Illinois, Urbana-Champaign, Urbana, IL | 1130 hrs<br>AIAA-2016-0163<br>**Adaptive Variable-Fidelity Analysis and Design for A Tailless Aircraft with Innovative Control Effectors under Model-Form Uncertainty**<br>Y. Jo, Korea Advanced Institute of Science and Technology, Daejeon, South Korea ; J. Park, S. Choi, Virginia Polytechnic Institute and State University, Blacksburg, VA; D. Lee, Korea Advanced Institute of Science and Technology, Daejeon, South Korea | 1200 hrs<br>AIAA-2016-0164<br>**Aerodynamic Optimisation of Non-planar Lifting Surfaces**<br>S. Skinner, H. Zare-Behtash, University of Glasgow, Glasgow, United Kingdom |

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| **36-MST-1** | **Modeling and Simulation of Air Traffic Management I** | | | | | **Golden Hill A** |
| Chaired by: J. SCHROEDER, Federal Aviation Administration and D. CARTMELL, Boeing Engineering Operations & Technology | | | | | | |
| 0900 hrs<br>AIAA-2016-0165<br>**Probabilistic Airport Aceptance Rate Prediction**<br>J. Cox, M. Kochenderfer, Stanford University, Stanford, CA | 0930 hrs<br>AIAA-2016-0166<br>**Effects of Aircraft Mass and Weather Data Errors on Trajectory Optimization and Benefits Estimation**<br>N. Wickramasinghe, M. Brown, Electronic Navigation Research Institute, Tokyo, Japan; Y. Miyamoto, Y. Miyazawa, Kyushu University, Fukuoka, Japan | 1000 hrs<br>AIAA-2016-0167<br>**Creating severe weather model for arrival manager by analyzing the flight data of weather front passage**<br>A. Tezuka, Waseda University, Tokyo, Japan; A. Senoguchi, Electronic Navigation Research Institute, Tokyo, Japan | 1030 hrs<br>AIAA-2016-0168<br>**Analyzing Feasibility of Continuous Descent Operation Following Fixed-flight Path Angle from Oceanic Route to Tokyo International Airport**<br>E. Itoh, N. Wickramasinghe, H. Hirabayashi, K. Uejima, S. Fukushima, Electronic Navigation Research Institute, Tokyo, Japan | 1100 hrs<br>AIAA-2016-0169<br>**Human-in-the-Loop Simulation Analysis of Conflict Resolution Maneuvers Using an Air Traffic Control Simulation**<br>H. Oh, S. Jeong, K. Choi, H. Lee, Inha University, Incheon, South Korea | | |

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| **37-MST-2** | **Special Topics in Modeling and Simulation** | | | | | **Hillcrest D** |
| Chaired by: P. ZAAL, NASA Ames Research Center and A. ELMILIGUI, NASA Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-0170<br>**Modeling And Simulation of Spacecraft Pointing Modes Using Quaternion-Based Nonlinear Control Laws**<br>H. Bel, A. Aly, A. Youssef, Y. Elhalwagy, Military Technical College, Cairo, Egypt | 0930 hrs<br>AIAA-2016-0171<br>**Compressor Performance Modeling and Prognostics Using Artificial Neural Networks**<br>S. Ritz, J. Dahlen, Simulations Plus, Inc., Lancaster, CA; R. Harffield, Auburn University, Auburn, AL; W. Woltosz, Simulations Plus, Inc., Lancaster, CA | 1000 hrs<br>AIAA-2016-0172<br>**Development of a Cockpit-Pilot Model for Thermal Comfort Optimization During Long-Mission Flight**<br>J. Schminder, R. Gårdhagen, E. Nilsson, Linköping University, Linköping, Sweden; K. Storck, Saab, Linköping, Sweden; M. Karlsson, Linköping University, Linköping, Sweden | 1030 hrs<br>AIAA-2016-0173<br>**Aerodynamic Modelling of a 5-MW Wind Turbine for Development and Application of Real-Time Nonlinear Receding Horizon Control**<br>P. Galvani, Federal University of ABC, São Paulo, Brazil; F. Sun, K. Turkoglu, San Jose State University, San Jose, CA | 1100 hrs<br>AIAA-2016-0174<br>**Optimal Attitude Control of a 6U CubeSat with a Four-Wheel Pyramid Reaction Wheel Array and Magnetic Torque Coils**<br>K. Gross, Air Force Research Laboratory, Wright-Patterson AFB, OH; R. Patrick, E. Swenson, J. Agte, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1130 hrs<br>AIAA-2016-0175<br>**Extracting measurements from operational flight data using the flare example**<br>C. Wang, L. Drees, F. Holzapfel, Technical University of Munich, Munich, Germany | 1200 hrs<br>AIAA-2016-0176<br>**Simulation of Spatial Automatic Assembly System Based on Stewart Platform**<br>J. Qi, C. Wang, Beihang University, Beijing, China |

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| **38-NW-3**<br>**0900 - 0930 hrs** | **Monday Late Morning Networking Coffee Break** | **Session Room Foyers** |

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| **39-PC-1** | **Combustion Chemistry** | | | | | **Harbor C** |
| Chaired by: H. CHELLIAH, University of Virginia and Y. JU, Princeton University | | | | | | |
| 0900 hrs<br>AIAA-2016-0177<br>**An Overview of the National Jet Fuels Combustion Program**<br>M. Colket, Self, East Hartford, CT; J. Heyne, University of Dayton, Dayton, OH; M. Rumizen, Federal Aviation Administration, Burlington, MA; J. Edwards, Air Force Research Laboratory, Wright-Patterson AFB, OH; M. Gupta, Federal Aviation Administration, Washington, D.C.; W. Roquemore, Air Force Research Laboratory, Wright-Patterson AFB, OH; et al. | | 1000 hrs<br>AIAA-2016-0178<br>**Shock Tube Measurements of Jet and Rocket Fuels**<br>D. Davidson, Y. Zhu, S. Wang, T. Parise, R. Sur, R. Hanson, Stanford University, Stanford, CA | 1030 hrs<br>AIAA-2016-0179<br>**Shock Tube Ignition and $CH_4$ Time-Histories during Propanal Oxidation**<br>B. Koroglu, O. Pryor, J. Lopez, L. Nash, S. Vasu, University of Central Florida, Orlando, FL | 1100 hrs<br>AIAA-2016-0180<br>**Reduced-species mechanisms for the combustion of cyclohexane using the Local Self Similarity Tabulation method**<br>P. Kourdis, California Institute of Technology, Pasadena, CA; J. Bellan, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | 1130 hrs<br>AIAA-2016-0181<br>**Consistent Chemical Mechanism from Collaborative Data Processing**<br>N. Slavinskaya, U. Riedel, M. Abbasi, J. Starke, German Aerospace Center (DLR), Stuttgart, Germany; A. Tursynbai, Kazakh National University, Almaty, Kazakhstan; M. Frenklach, University of California, Berkeley, Berkeley, CA; et al. | 1200 hrs<br>AIAA-2016-0182<br>**Modeling Chemical Mechanism for Surrogate Jet Fuel under Scramjet Operating Conditions**<br>W. Huang, F. Chen, H. Liu, X. Huang, Shanghai Jiao Tong University, Shanghai, China |

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| **40-PC-2** | **Advanced Concepts, Combustion Diagnostics, Environmental Impact** | | | | | **Cortez Hill C** |
| Chaired by: I. BOXX, DLR - German Aerospace Center and Y. IKEDA, Imagineering, Inc. | | | | | | |
| 0900 hrs<br>AIAA-2016-0183<br>**Green Propellant Infusion Mission (GPIM), Advancing the State of Propulsion System Safety and Performance**<br>C. McLean, Ball Aerospace & Technologies Corporation, Boulder, CO | 0930 hrs<br>AIAA-2016-0184<br>**Nano-ignition Torch Applied to Cryogenic H2/O2 Coaxial Jet**<br>A. Badakhshan, ERC Inc., Edwards, CA; S. Danczyk, Air Force Research Laboratory, Edwards, CA; D. Forliti, Sierra Labo, Inc., Edwards, CA; I. Leyva, Air Force Office of Scientific Research, Arlington, VA; D. Talley, Air Force Research Laboratory, Edwards, CA | 1000 hrs<br>AIAA-2016-0185<br>**Investigation of Confined Turbulent Jet Flames Using kHz-Rate Diagnostics**<br>Z. Yin, I. Boxx, M. Stöhr, O. Lammel, W. Meier, German Aerospace Center (DLR), Stuttgart, Germany | 1030 hrs<br>AIAA-2016-0186<br>**PIV Measurement for Diffusion Flame in A Porous Cylindrical Burner**<br>K. Pan, C. Guo, National Taiwan University, Taipei, Taiwan | 1100 hrs<br>AIAA-2016-0187<br>**Effect of Reactant Inlet Temperature on Passive Mitigation of Thermo-acoustic Instabilities by Implementation of 3D Additive Manufactured Metallic Porous Insert**<br>J. Kornegay, D. Depperschmidt, A. Agrawal, University of Alabama, Tuscaloosa, Tuscaloosa, AL | 1130 hrs<br>AIAA-2016-0188<br>**High-Speed Imaging of Ignition behind Reflected Shock Waves**<br>D. Davidson, A. Tulgestke, R. Hanson, Stanford University, Stanford, CA | 1200 hrs<br>AIAA-2016-0189<br>**Direct Numerical Simulation of Turbulent Lean Methane-Air Bunsen Flame with Mixture Inhomogeneities**<br>S. Luca, A. Attili, F. Bisetti, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia |

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| **41-PDL-1** | **Plasma Assisted Combustion** | | | | | **Harbor D** |
| Chaired by: I. ADAMOVICH, Ohio University and J. ROVEY, Missouri University of Science & Technology | | | | | | |
| 0900 hrs<br>AIAA-2016-0190<br>**Simulations of plasma-assisted combustion flames in coaxial microwave reactors**<br>J. Zimmerman, A. Palla, D. King, D. Carroll, CU Aerospace, LLC, Champaign, IL; C. Mitsingas, R. Rajasegar, University of Illinois, Urbana-Champaign, Urbana, IL; et al. | 0930 hrs<br>AIAA-2016-0191<br>**Plasma Assisted Combustion Mechanism for Hydrogen and Small Hydrocarbons**<br>A. Starikovskiy, Princeton University, Princeton, NJ; N. Aleksandrov, Moscow Institute of Physics and Technology, Moscow, Russia | 1000 hrs<br>AIAA-2016-0192<br>**Kinetics of plasma-assisted oxidation of methane**<br>K. Togai, N. Tsolas, R. Yetter, Pennsylvania State University, University Park, PA | 1030 hrs<br>AIAA-2016-0193<br>**Effects of Axial Stretch on the Flame Propagation Enhancement of Large Hydrocarbons by Addition of Ozone**<br>M. Pinchak, University of Cincinnati, Cincinnati, OH; T. Ombrello, C. Carter, Air Force Research Laboratory, Wright-Patterson AFB, OH; E. Gutmark, University of Cincinnati, Cincinnati, OH; V. Katta, Innovative Scientific Solutions, Inc., Dayton, OH | 1100 hrs<br>AIAA-2016-0194<br>**Plasma assisted GT combustion**<br>A. Starikovskiy, Princeton University, Princeton, NJ; A. Zagorskiy, T. Wind, F. Guethe, GE Power, Baden, Switzerland | 1130 hrs<br>AIAA-2016-0195<br>**Parallel On-the-fly Adaptive Kinetics for Non-equilibrium Plasma Discharges of $C_2H_4/O_2$/ Ar Mixture**<br>S. Yang, V. Yang, W. Sun, Georgia Institute of Technology, Atlanta, GA; S. Nagaraja, General Electric Company, Schenectady, NY; W. Sun, Y. Ju, Princeton University, Princeton, NJ; et al. | |

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| **42-PDL-2** | **DBD Plasma Actuators I** | | | | | **Ocean Beach** |
| Chaired by: K. KONTIS, University of Glasgow | | | | | | |
| 0900 hrs<br>AIAA-2016-0196<br>**Electrode Material Degradation Monitoring for Durable Dielectric Barrier Discharge Plasma Actuators Manufacturing**<br>A. Iwakawa, M. De Giorgi, University of Salento, Lecce, Italy; L. Francioso, A. Taurino, National Research Council (CNR), Lecce, Italy; P. Lavoie, University of Toronto, Toronto, Canada | 0930 hrs<br>AIAA-2016-0197<br>**Direct Position Control of Dielectric Barrier Discharge Filaments**<br>M. Paliwoda, J. Rovey, Missouri University of Science and Technology, Rolla, MO | 1000 hrs<br>AIAA-2016-0198<br>**PIV-Estimated DBD Plasma-Actuator Thrust Verified by Measurement in Quiescent Air**<br>L. Wu, C. Gao, X. Yan, Northwestern Polytechnical University, Xi'an, China; F. Liu, S. Luo, University of California, Irvine, Irvine, CA | 1030 hrs<br>AIAA-2016-0199<br>**Coaxial DBD Actuator Design for Control of a Hydrogen Diffusion Flame**<br>J. Retter, R. Fontaine, J. Freund, N. Glumac, G. Elliott, University of Illinois, Urbana-Champaign, Urbana, IL | | | |

| Monday, 4 January 2016 | | | | | | |
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| **43-SD-1** | **Structural Dynamic Modeling and Analysis** | | | | | **Balboa C** |
| Chaired by: C. HEBERT, Sierra Nevada Corporation and M. ROSS, Sandia National Laboratories | | | | | | |
| 0900 hrs<br>AIAA-2016-0200<br>**Joining 3-D Finite Elements to Variational Asymptotic Beam Models**<br>H. Hoseini, D. Hodges, Georgia Institute of Technology, Atlanta, GA | 0930 hrs<br>AIAA-2016-0201<br>**Constrained-Energy Cross-Well Actuation of the Duffing-Holmes Oscillator**<br>M. Zarepoor, O. Bilgen, Old Dominion University, Norfolk, VA | 1000 hrs<br>AIAA-2016-0202<br>**The Evaluation of an Icosahedron' Eigenvalue**<br>A. Palazotto, L. Just, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1030 hrs<br>AIAA-2016-0203<br>**Evaluating the stiffness of conic interfacing parts : a practical method for finite element model updating based on experimental modal testing**<br>A. Letarte, S. Joncas, École de Technologie Supérieure, Montréal, Canada; A. Ross, École Polytechnique de Montréal, Montréal, Canada; F. Martin, Canadian Space Agency, Saint-Hubert, Canada | 1100 hrs<br>AIAA-2016-0204<br>**Force Reconstruction from Ejection Tests of Aircraft Stores Used for Model Predictions and Missing/ Bad Gages**<br>M. Ross, M. Starr, A. Urbina, J. Cap, A. Brink, Sandia National Laboratories, Albuquerque, NM | 1130 hrs<br>AIAA-2016-0205<br>**Towards a Fluid-Structure Interaction Solver for Problems with Large Deformations Within the Open-Source SU2 Suite**<br>R. Sanchez, R. Palacios, Imperial College London, London, United Kingdom; T. Economon, H. Kline, J. Alonso, Stanford University, Stanford, CA; F. Palacios, The Boeing Company, Long Beach, CA | |

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| **44-SD-2** | **Energy Harvesting** | | | | | **Gaslamp A** |
| Chaired by: D. KUMAR, University of Michigan and K. SINGH, Miami Univeristy | | | | | | |
| 0900 hrs<br>AIAA-2016-0206<br>**Toward broadband resistive-inductive piezoelectric energy harvesters**<br>H. Abdelmoula, A. Abdelkefi, New Mexico State University, Las Cruces, NM | 0930 hrs<br>AIAA-2016-0207<br>**The Role of Sweep Rate in Energy Harvesting**<br>T. Hynds, J. Kauffman, University of Central Florida, Orlando, FL | 1000 hrs<br>AIAA-2016-0208<br>**Representation and comparative study of electromagnetic-piezoelectric galloping energy harvesters**<br>U. Javed, New Mexico State University, Las Cruces, NM; H. Dai, Huazhong University of Science and Technology, Wuhan, China; A. Abdelkefi, New Mexico State University, Las Cruces, NM | 1030 hrs<br>AIAA-2016-0209<br>**Piezoaeroelastic investigation on the control and energy harvesting of galloping systems**<br>H. Abdelmoula, A. Abdelkefi, New Mexico State University, Las Cruces, NM | 1100 hrs<br>AIAA-2016-0210<br>**Energy Harvesting From Aeroelastic Instabilities**<br>N. Hosking, Z. Sotoudeh, Rensselaer Polytechnic Institute, Troy, NY | 1130 hrs<br>AIAA-2016-0211<br>**Enhanced stability identi cation and global response prediction of galloping energy harvesters**<br>U. Javed, A. Abdelkefi, New Mexico State University, Las Cruces, NM; I. Akhtar, National University of Sciences and Technology, Islamabad, Pakistan | |

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| **45-SE-1** | **Systems Engineering I** | | | | | **Americas Cup B** |
| Chaired by: J. EILER, Stellar Solutions, Inc. and M. FRENCH, Rolls-Royce Corp | | | | | | |
| 0900 hrs<br>AIAA-2016-0212<br>**Theoretical Foundations for the Discipline of Systems Engineering**<br>S. Johnson, University of Colorado, Colorado Springs, Colorado Springs, CO; J. Day, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | 0930 hrs<br>AIAA-2016-0213<br>**Can the Capability Maturity Model® Contribute to a Common Model for Systems Engineering?**<br>V. Johnson, Textron Aviation, Wichita, KS | 1000 hrs<br>AIAA-2016-0214<br>**A Systems Engineering Approach to the Conceptual Design of a Martian UAV**<br>S. D'Urso, K. Tsai, P. Chadha, H. Hilton, University of Illinois, Urbana-Champaign, Urbana, IL | 1030 hrs<br>AIAA-2016-0215<br>**Integrated Assessment of Aircraft and Novel Subsystem Architectures in Early Design**<br>I. Chakraborty, D. Mavris, Georgia Institute of Technology, Atlanta, GA | 1100 hrs<br>AIAA-2016-0216<br>**A Methodology for Sizing and Analysis of Electric Propulsion Subsystems for Unmanned Aerial Vehicles**<br>G. Cinar, Georgia Institute of Technology, Atlanta, GA; M. Emeneth, PACE America Inc., Seattle, WA; D. Mavris, Georgia Institute of Technology, Atlanta, GA | | |

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| **46-SEO-1** | **Intelligent and Autonomous Systems for Improving Space Exploration and Operations** | | | | | **Americas Cup A** |
| Chaired by: D. LAVALLEE, The Johns Hopkins University Applied Physics Laboratory and S. VAN Y, Accenture Limited | | | | | | |
| 0900 hrs<br>AIAA-2016-0217<br>**Optimization of Injection Parameters for Slightly Inclined Geosynchronous Orbits**<br>J. Shan, N. Bijnens, York University, Toronto, Canada | 0930 hrs<br>AIAA-2016-0218<br>**Space Data Integrator: FAA's Innovative Platform for Launch and Reentry Operations**<br>L. Mutuel, Sierra Nevada Corporation, Sparks, NV; D. Murray, Federal Aviation Administration, Washington, D.C. | 1000 hrs<br>AIAA-2016-0219<br>**A High-Heritage Blunt-Body Entry, Descent, and Landing Concept for Human Mars Exploration**<br>H. Price, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; R. Braun, Georgia Institute of Technology, Atlanta, GA; R. Manning, E. Sklyanski, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | 1030 hrs<br>AIAA-2016-0220<br>**Impactor Missions to Europa and Ganymede: Seismic Approach for Estimating Icy Crust Thickness**<br>A. Franqui, S. Seufert, M. Cosenza, M. Okutsu, Catholic University of America, Washington, D.C. | 1100 hrs<br>AIAA-2016-0221<br>**Impact and Crashworthiness Characteristics of Venera Type Landers for Future Venus Missions**<br>K. Schroeder, J. Bayandor, Virginia Polytechnic Institute and State University, Blacksburg, VA; J. Samareh, NASA Langley Research Center, Hampton, VA | | |

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| 47-SOF-1 | Software Architecture and Robust Software Engineering | | | | | Regatta A |
| Chaired by: C. THAMES, NASA Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-0222<br>**Formally Verified Run Time Assurance Architecture of a 6U CubeSat Attitude Control System**<br>K. Gross, M. Clark, J. Hoffman, Air Force Research Laboratory, Wright-Patterson AFB, OH; A. Fifarek, LinQuest, Dayton, OH; K. Rattan, Wright State University, Dayton, OH; E. Swenson, Air Force Institute of Technology, Wright-Patterson AFB, OH; et al. | 0930 hrs<br>AIAA-2016-0223<br>**New Requirement-Definition and Verification Techniques According to DO-178C, DO-331, and DO-333**<br>U. Eisemann, dSPACE GmbH, Paderborn, Germany; J. Allen, dSPACE Inc., Wixom, MI | | | | | |

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| 48-SRE-1 | Extraterrestrial Water: Prospecting and Acquisition | | | | | Bankers Hill |
| Chaired by: J. KLEINHENZ, NASA Glenn Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-0224<br>**Accessing, Drill and Operating at the Lunar South Pole: Status of European Plans and Activities**<br>R. Fisackerly, J. Carpenter, B. Houdou, G. Visentin, ESA, Noordwijk, The Netherlands ; F. Rizzi, M. Savoia, Selex ES, Nerviano, Italy; et al. | 0930 hrs<br>Oral Presentation<br>**Sample Acqusition Systems for a Free-Flying Unmanned Robotic System to Support Interplanetary Bodies Prospecting and Characterization Missions**<br>K. Zacny, B. Yaggi, J. Spring, P. Chu, Honeybee Robotics, Pasadena, CA; R. Mueller, T. Ebert, NASA Kennedy Space Center, Cape Canaveral, FL; et al. | 1000 hrs<br>AIAA-2016-0225<br>**Laboratory Apparatus for Evaluating Volatiles Production from Meteorites and Simulants: Design and Testing**<br>L. Gertsch, Missouri University of Science and Technology, Rolla, MO; A. Abbud-Madrid, C. Dreyer, Colorado School of Mines, Golden, CO; J. Heniff, Missouri University of Science and Technology, Rolla, MO; D. Linne, NASA Glenn Research Center, Cleveland, OH; J. Mantovani, NASA Kennedy Space Center, Cape Canaveral, FL; et al. | 1030 hrs<br>AIAA-2016-0226<br>**Extraction and Capture of Water from Martian Regolith Experimental Proof-of-Concept**<br>D. Linne, J. Kleinhenz, NASA Glenn Research Center, Cleveland, OH | 1100 hrs<br>AIAA-2016-0227<br>**Mechanical Properties of Icy Mars Regolith Simulant: Assessment of a Potential ISRU Feedstock**<br>R. Ash, J. Emery, B. Crane, J. Ricci, Old Dominion University, Norfolk, VA | 1130 hrs<br>AIAA-2016-0228<br>**Near-Infrared monitoring of volatiles in frozen lunar simulants while drilling**<br>T. Roush, A. Colaprete, R. Elphic, J. Forgione, B. White, R. McMurray, NASA Ames Research Center, Moffett Field, CA; et al. | 1200 hrs<br>Oral Presentation<br>**Regolith Volatile Recovery at Simulated Lunar Environment**<br>J. Kleinhenz, NASA Glenn Research Center, Cleveland, OH; G. Paulsen, K. Zacny, Honeybee Robotics, Pasadena, CA; S. Schmidt, D. Boucher, Deltion Innovations, Ltd., Capreol, Canada |

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| 49-STR-1 | Aircraft Structural Design I | | | | | La Jolla A |
| Chaired by: M. WOLFF, Gulfstream Aerospace Corporation and P. MARDANPOUR | | | | | | |
| 0900 hrs<br>AIAA-2016-0229<br>**Conceptual Design and Structural Optimization of NASA Environmentally Responsible Aviation (ERA) Hybrid Wing Body Aircraft**<br>J. Quinlan, F. Gern, NASA Langley Research Center, Hampton, VA | 0930 hrs<br>AIAA-2016-0230<br>**Moving Aerospace Structural Design Practice to a Load and Resistance Factor Approach**<br>C. Larsen, NASA Johnson Space Center, Houston, TX; I. Raju, NASA Langley Research Center, Hampton, VA | 1000 hrs<br>AIAA-2016-0231<br>**A Historical Assessment of Building Block Development Test Programs for Modern Military Aircraft**<br>D. Norwood, Lockheed Martin Corporation, Fort Worth, TX; G. Hahn, P. Joyce, R. Wippich-Dienhart, The Boeing Company, St. Louis, MO | 1030 hrs<br>AIAA-2016-0232<br>**Structural Loads Analysis of a Carrier Onboard Delivery Aircraft**<br>B. Flansburg, Lockheed Martin Corporation, Marietta, GA | 1100 hrs<br>AIAA-2016-0233<br>**Determination of Load Path Using Streamline Analogy and Galerkin Method**<br>K. Gharibi, A. Tamijani, Embry-Riddle Aeronautical University, Daytona Beach, FL | 1130 hrs<br>AIAA-2016-0234<br>**Preliminary Wing Study of General Aviation Aircraft with PRSEUS panels**<br>V. Papapetrou, A. Tamijani, D. Kim, Embry-Riddle Aeronautical University, Daytona Beach, FL | 1200 hrs<br>AIAA-2016-0235<br>**Bi-Level Optimization of a Conceptual Metallic Wing Box with Stiffness Constraints**<br>A. Noevere, A. Wilhite, Georgia Institute of Technology, Atlanta, GA |

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| **50-STR-2** | **Challenges in the Design of Joined Wings** | | | | | **La Jolla B** |
| Chaired by: R. CAVALLARO, Technion, Israel Institute of Technology and L. DEMASI, San Diego State University College of Engineering | | | | | | |
| 0900 hrs<br>AIAA-2016-0236<br>**Minimum Induced Drag Theorems for Multi-Wing Systems**<br>L. Demasi, San Diego State University, San Diego, CA; G. Monegato, Technical University of Turin, Turin, Italy; R. Cavallaro, Technion–Israel Institute of Technology, Haifa, Israel | 0930 hrs<br>AIAA-2016-0237<br>**Transonic Aeroelastic Analysis for Multidisciplinary Design Optimization Applications**<br>W. Mallik, R. Kapania, J. Schetz, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1000 hrs<br>AIAA-2016-0238<br>**Aeroelasticity of Joined Wings: Unique Aspects and Challenges**<br>R. Cavallaro, Technion–Israel Institute of Technology, Haifa, Israel; L. Demasi, San Diego State University, San Diego, CA; R. Bombardieri, University of Pisa, Pisa, Italy | 1030 hrs<br>AIAA-2016-0239<br>**Distributed Optical Sensing in Composite Laminate Adhesive Bonds**<br>L. Meadows, R. Sullivan, Mississippi State University, Mississippi State, MS; K. Vehorn, University of Dayton Research Institute, Dayton, OH | | | |

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| **51-TES-1**<br>**0900 - 1230 hrs** | **The State and Future of Energy Systems** | | | | | **Old Town A** |
| Moderators: Tom Shih, Purdue University and Ashwani Gupta, University of Maryland | | | | | | |
| *Nanoscale Thermal Tranport*<br>**Tim Fisher**<br>Purdue University | *Thermal Energy Storage Materials*<br>**Patrick Shamberger**<br>Texas A&M University | *Control Issues in Thermal Management*<br>**Andrew Alleyne**<br>University of Illinois, Urbana–Champaign | *Challenges and Opportunities in Thermal Management*<br>**Tom Shih**<br>Purdue University | *Integration of Dynamic Thermal Systems*<br>**Mitch Wolf**<br>Wright State University | | |

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| **52-TES-2/TP-1** | **Joint Session: Heat Transfer in Terrestrial Energy Systems** | | | | | **Old Town B** |
| Chaired by: D. PYTEL, Lockheed Martin Space Systems and A. HASHEMI, Lockheed Martin Space Systems | | | | | | |
| 0900 hrs<br>AIAA-2016-0240<br>**Mist cooling ratios analysis in rectangular passage with 45-deg angled rib**<br>H. Alhajeri, J. Amaral Teixeira, A. Addali A., A. Gamil A. A., A. Alenezi, Cranfield University, Cranfield, United Kingdom | 0930 hrs<br>AIAA-2016-0241<br>**Jet Impingement Heat Transfer Enhancement on a rib-roughened Flat Plate**<br>A. Alenezi, J. Amaral Teixeira, A. Addali A., A. Gamil A. A., H. Alhajeri, Cranfield University, Cranfield, United Kingdom | 1000 hrs<br>AIAA-2016-0242<br>**Effect of porous insert on flame dynamics in a lean premixed swirl-stabilized combustor using planar laser-induced flueorescence**<br>J. Allen, University of Alabama, Tuscaloosa, Tuscaloosa, AL; B. Fisher, Naval Research Laboratory, Washington, D.C.; A. Agrawal, University of Alabama, Tuscaloosa, Tuscaloosa, AL | 1030 hrs<br>AIAA-2016-0243<br>**Design of a Supersonic Oxy-Methane Combustor for Direct Power Extraction**<br>M. Hernandez, L. Cabrera , O. Vidana, M. Chaidez, N. Love, University of Texas, El Paso, El Paso, TX | 1100 hrs<br>Oral Presentation<br>**Eulerian-Lagrangian modeling of particle-laden flow**<br>S. Davis, G. Jacobs, San Diego State University, San Diego, CA | 1130 hrs<br>Oral Presentation<br>**Study of Kaplan Hydro Turbine Performance**<br>Y. Yen, T. ElHammal, R. Amano, University of Wisconsin, Milwaukee, Glendale, WI | |

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| **53-TP-2** | **Thermal Protection System, Ablation and Surface Catalysis I** | | | | | **Harbor G** |
| Chaired by: D. KUNTZ, Sandia National Laboratories and D. HASH, NASA - ARC | | | | | | |
| 0900 hrs<br>AIAA-2016-0244<br>**Laser Ablation of Dielectrics for Development of High Temperature Sapphire Based Pressure Transducers**<br>P. Woerner, W. Oates, Florida State University, Tallahassee, FL; M. Sheplak, University of Florida, Gainesville, Gainesville, FL; D. Blood, Valparaiso University, Valparaiso, IN; D. Mills, University of Florida, Gainesville, Gainesville, FL | 0930 hrs<br>AIAA-2016-0245<br>**Radiative Transfer In A Rigid Carbon Material Under Arcjet Flow Condition**<br>T. Sakai, T. Horiuchi, T. Suzuki, H. Fukui, Nagoya University, Nagoya, Japan; Y. Ishida, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan | 1000 hrs<br>AIAA-2016-0246<br>**Near-Surface $CO_2$ Tunable Diode Laser Absorption Spectroscopy Concentration Measurements in the LENS-XX Expansion Tunnel Facility**<br>J. Weisberger, P. DesJardin, State University of New York, Buffalo, NY; M. MacLean, R. Parker, Z. Carr, CUBRC, Buffalo, NY | 1030 hrs<br>AIAA-2016-0247<br>**Numerical Prediction of Tungsten Ablation under Arc Heater Experimental Conditions**<br>S. Noh, K. Kim, Seoul National University, Seoul, South Korea | 1100 hrs<br>AIAA-2016-0248<br>**Effect of spalled particles thermal degradation on a hypersonic flow field environment**<br>R. Davuluri, H. Zhang, A. Martin, University of Kentucky, Lexington, Lexington, KY | | |

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| **54-UMS-1** | **Unmanned Systems: Mission Management and Planning Technologies** | | | | | **Regatta C** |
| Chaired by: M. LOGAN, NASA Langley Research Center and M. ANDERSON | | | | | | |
| 0900 hrs<br>AIAA-2016-0249<br>**Comprehensive Safety System Design and Development for Unmanned Aerial Vehicles Formation Flight System**<br>D. Wei, Nanyang Technological University, Singapore, Singapore | 0930 hrs<br>AIAA-2016-0250<br>**Privacy Aware Mission Planning and Video Masking for UAV Systems**<br>R. Martin, Brigham Young University, Provo, UT; A. Hall, C. Brinton, Mosaic ATM, Inc., Leesburg, VA; K. Franke, J. Hedengren, Brigham Young University, Provo, UT | 1000 hrs<br>AIAA-2016-0251<br>**Hierarchical Path Planning Using Q-Learning and Incremental Approximate Dynamic Programming**<br>Y. Zhou, E. Van Kampen, Q. Chu, Delft University of Technology, Delft, The Netherlands | 1030 hrs<br>AIAA-2016-0252<br>**Experimental Assessment of Online Dynamic Soaring Optimization for Small Unmanned Aircraft**<br>W. Silva, E. Frew, University of Colorado, Boulder, Boulder, CO | 1100 hrs<br>AIAA-2016-0253<br>**Navigation and Guidance Strategy Planning for UAV Urban Operation**<br>Y. Watanabe, A. Veillard, ONERA, Toulouse, France; C. Chanel, University of Toulouse, Toulouse, France | 1130 hrs<br>AIAA-2016-0254<br>**BugFlood: A bug inspired algorithm for efficient path planning in an obstacle rich environment**<br>N. Sharma, Indraprastha Institute of Information Technology Delhi, New Delhi, India; J. Pinto, University of Porto, Porto, Portugal; P. Sujit, Indraprastha Institute of Information Technology Delhi, New Delhi, India | 1200 hrs<br>AIAA-2016-0255<br>**Development of an Area of Interest Extended Coverage Loitering Path Planner**<br>J. Wilhelm, J. Rojas, West Virginia University, Morgantown, WV |

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| **55-PANEL-1**<br>**0930 - 1130 hrs** | **Monday Morning Forum 360**<br><br>**Distilling Your Message: Putting yourself back into your science and engineering** | **Seaport F-G** |

Facilitator: Christine O'Connell, Associate Director, Alan Alda Center for Communicating Science, Stony Brook University - School of Journalism

Effective science communication is necessary in fostering ongoing conversations between scientists and engineers, policy makers, and the general public, as well as promoting science literacy. The ability to communicate directly and vividly can help with securing funding, collaborating across disciplines, and strengthening research. The challenge is for scientists to be clear and engaging without oversimplifying the science. This interactive presentation suggests tools and examples to help scientists and engineers communicate in ways that resonate with people outside of their field about what they do and why it matters. We will cover general principles in how to craft clear, conversational statements, and avoid jargon. Participants will be actively engaged in explaining scientific material and engineering principles to lay people to develop and practice clarity in speaking to non-scientists and engineers about their work.

| Monday, 4 January 2016 | | |
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| **56-SOF-2**<br>**1030 - 1230 hrs** | **Lightweight Perfection: Why and How You Should Review Code for Small Teams** | **Regatta A** |

A panel of experts will teach participants why you should run code reviews even for development teams of two, and how to run code reviews in small teams.

Panelists:

**Misty Davies**
NASA Ames Research Center

**Jim Murphy**
NASA Ames Research Center

**Chris Thames**
NASA Langley Research Center

| Monday, 4 January 2016 | | |
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| **57-LUNCH-1**<br>**1230 - 1400 hrs** | **Durand Lectureship for Public Service and Luncheon** | **Seaport A-E** |

*Thoughts on Complex Systems Solutions in the 21st Century*

**Ronald M. Sega**
Vice President for Energy, the Environment, and Applied Research
Colorado State University Research Foundation

| Monday, 4 January 2016 | | | | | | |
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| **58-AA-2** | **Computational Aeroacoustics I** | | | | | **Nautical** |
| Chaired by: A. LYRINTZIS and S. ARUNAJATESAN, Sandia National Labs | | | | | | |
| 1400 hrs<br>AIAA-2016-0256<br>**Numerical Simulation of the Noise from Tandem Cylinder Flow with Spectral Difference Method**<br>J. Gao, X. Li, Beihang University, Beijing, China | 1430 hrs<br>AIAA-2016-0257<br>**Implementation of a Wall-Modeled Sharp Immersed Boundary Method in a High-Order Large Eddy Simulation Tool for Jet Aeroacoustics**<br>N. Dhamankar, G. Blaisdell, Purdue University, West Lafayette, IN; A. Lyrintzis, Embry-Riddle Aeronautical University, Daytona Beach, FL | 1500 hrs<br>AIAA-2016-0258<br>**Detached Eddy Simulation of High-Lift Wing Slat Track and Cut-Out Noise**<br>X. Wang, Z. Hu, University of Southampton, Southampton, United Kingdom | 1530 hrs<br>AIAA-2016-0259<br>**Lattice Boltzmann Method for Aeroacoustic Simulations with Block-Structured Cartesian Grid**<br>T. Ishida, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan | 1600 hrs<br>AIAA-2016-0260<br>**Noise estimation of beveled trailing edges using an integral and boundary element method**<br>W. van der Velden, A. van Zuijlen, A. de Jong, H. Bijl, Delft University of Technology, Delft, The Netherlands | 1630 hrs<br>AIAA-2016-0261<br>**A study of the influence of grid resolution and axial extent on the prediction of jet turbulence and noise**<br>C. Bogey, O. Marsden, École Centrale de Lyon, Ecully, France | |

| Monday, 4 January 2016 | | | | | | |
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| **59-ABPSI-2/GEPC-2** | **NASA ERA Systems Integration II** | | | | | **Golden Hill B** |
| Chaired by: J. FLAMM, NASA Langley Research Center and G. DALE, Air Force Research Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-0262<br>**NASA ERA Integrated CFD for Wind Tunnel Testing of Hybrid Wing-Body Configuration (Invited)**<br>J. Garcia, J. Melton, M. Schuh, K. James, K. Long, NASA Ames Research Center, Moffett Field, CA; D. Vicroy, NASA Langley Research Center, Hampton, VA; et al. | 1430 hrs<br>AIAA-2016-0263<br>**NASA Environmentally Responsible Aviation Hybrid Wing Body Flow-Through Nacelle Wind Tunnel CFD (Invited)**<br>M. Schuh, J. Garcia, NASA Ames Research Center, Moffett Field, CA; M. Carter, K. Deere, NASA Langley Research Center, Hampton, VA; P. Stremel, Science and Technology Corporation, Moffett Field, CA; D. Tompkins, The Boeing Company, Huntington Beach, CA | 1500 hrs<br>AIAA-2016-0264<br>**Computational Evaluation of Inlet Distortion on an Ejector Powered Hybrid Wing Body at Takeoff and Landing Conditions (Invited)**<br>M. Sexton, D. Tompkins, The Boeing Company, Huntington Beach, CA; K. Deere, S. McMillin, M. Carter, NASA Langley Research Center, Hampton, VA; M. Schuh, NASA Ames Research Center, Moffett Field, CA; et al. | 1530 hrs<br>AIAA-2016-0265<br>**Estimating Flow-Through Balance Momentum Tares with CFD (Invited)**<br>J. Melton, K. James, NASA Ames Research Center, Moffett Field, CA; J. Flamm, NASA Langley Research Center, Hampton, VA; K. Long, NASA Ames Research Center, Moffett Field, CA | 1600 hrs<br>AIAA-2016-0266<br>**CFD Predictions for Transonic Performance of the ERA Hybrid Wing-Body Configuration (Invited)**<br>K. Deere, J. Luckring, S. McMillin, J. Flamm, NASA Langley Research Center, Hampton, VA; D. Roman, The Boeing Company, Long Beach, CA | 1630 hrs<br>AIAA-2016-0267<br>**Impact of Ultra-High Bypass/ Hybrid Wing Body Integration on Propulsion System Perrformance and Operability (Invited)**<br>W. Lord, G. Hendricks, M. Kirby, Pratt & Whitney, East Hartford, CT; S. Ochs, R. Lin, L. Hardin, United Technologies Corporation, East Hartford, CT | 1700 hrs<br>Oral Presentation<br>**Preferred System Concept System Assessment (Invited)**<br>J. Bonet, N. Princen, K. Elmer, P. Camacho, D. Tompkins, The Boeing Company, Huntington Beach, CA |

| Monday, 4 January 2016 | | | | | | |
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| **60-AFM-3** | **Special Session: Flight Testing in Education** | | | | | **Bankers Hill** |
| Chaired by: M. COTTING, US Air Force Test Pilot School and N. SARIGUL-KLIJN, University of California, Davis | | | | | | |
| 1400 hrs<br>AIAA-2016-0268<br>**Balancing Education and Training at the USAF Test Pilot School - Invited**<br>M. Cotting, W. Gray, U.S. Air Force Test Pilot School, Edwards AFB, CA | 1430 hrs<br>AIAA-2016-0269<br>**Undergraduate Learn by Doing Flight Test Curriculum - Invited**<br>K. Colvin, California Polytechnic State University, San Luis Obispo, CA | 1500 hrs<br>AIAA-2016-0270<br>**Flight Test Education at The Ohio State University - Invited**<br>J. Gregory, M. McCrink, Ohio State University, Columbus, OH | 1530 hrs<br>AIAA-2016-0271<br>**Flight Testing of Stability Boundary and Dynamic Separation in a University Environment - Invited**<br>N. Sarigul-Klijn, University of California, Davis, Davis, CA | 1600 hrs<br>AIAA-2016-0272<br>**Systems Test and Evaluation Education at NPS**<br>O. Yakimenko, Naval Postgraduate School, Monterey, CA | 1630 hrs<br>AIAA-2016-0273<br>**Flight Testing with Senior Design Students - Invited**<br>C. Hall, North Carolina State University, Raleigh, NC | 1700 hrs<br>AIAA-2016-0274<br>**Teaching Flight Testing Through Soaring - Invited**<br>J. Stewart, Virginia Polytechnic Institute and State University, Blacksburg, VA |

| Monday, 4 January 2016 | | | | | | |
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| **61-AFM-4** | **Atmospheric Entry, Hypersonic Flight and Aeroassist Technology II** | | | | | **Cortez Hill B** |
| Chaired by: M. GRANT, Purdue University and C. KARLGAARD, Analytical Mechanics Associates Inc | | | | | | |
| 1400 hrs<br>AIAA-2016-0275<br>**Rapid Indirect Trajectory Optimization on Highly Parallel Computing Architectures**<br>T. Antony, M. Grant, Purdue University, West Lafayette, IN | 1430 hrs<br>AIAA-2016-0276<br>**Rapid Indirect Trajectory Optimization of a Hypothetical Long Range Weapon System**<br>M. Grant, T. Antony, Purdue University, West Lafayette, IN | 1500 hrs<br>AIAA-2016-0277<br>**Tree Based Trajectory Planning for Mars Aerocapture.**<br>A. Chakrabarty, S. Swei, D. Prabhu, NASA Ames Research Center, Moffett Field, CA | 1530 hrs<br>AIAA-2016-0278<br>**Review and Assessment of the Steep Lifting Entry Closed-Form Trajectory Solution**<br>Z. Putnam, R. Braun, Georgia Institute of Technology, Atlanta, GA | 1600 hrs<br>AIAA-2016-0279<br>**Entry Guidance by Onboard Trajectory Planning and Tracking**<br>K. Webb, P. Lu, Iowa State University, Ames, IA | 1630 hrs<br>AIAA-2016-0280<br>**Dynamic Stability Analysis of Hypersonic Transport during Reentry**<br>G. Guruswamy, NASA Ames Research Center, Moffett Field, CA | |

| Monday, 4 January 2016 | | | | | | |
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| **62-AMT-2** | **Spectroscopy and Combustion Applications** | | | | | **Balboa B** |
| Chaired by: A. CUTLER, The George Washington University and S. KEARNEY, Sandia National Laboratories | | | | | | |
| 1400 hrs<br>AIAA-2016-0281<br>**Hybrid fs/ps Rotational CARS Temperature and Oxygen Measurements in a Sooting, Turbulent $C_2H_4$-Fueled Jet Flame**<br>S. Kearney, D. Guildenbecher, K. Gabet Hoffmeister, C. Winters, T. Grasser, J. Hewson, Sandia National Laboratories, Albuquerque, NM | 1430 hrs<br>AIAA-2016-0282<br>**Hybrid fs/ps CARS for Sooting and Particle-laden Flames**<br>K. Gabet Hoffmeister, D. Guildenbecher, S. Kearney, Sandia National Laboratories, Albuquerque, NM | 1500 hrs<br>AIAA-2016-0283<br>**Quantitative $O_2$ Measurements in Flames at Elevated Pressures by Laser-induced Breakdown Spectroscopy**<br>Y. Wu, C. Smith, Z. Zhang, University of Tennessee, Knoxville, Knoxville, TN | 1530 hrs<br>AIAA-2016-0284<br>**Evaluation of Hybrid fs/ps coherent anti-Stokes Raman scattering temperature and pressure sensitivity at combustor relevant conditions**<br>C. Dedic, J. Michael, Iowa State University, Ames, IA; J. Miller, Air Force Research Laboratory, Wright-Patterson AFB, OH; T. Meyer, Purdue University, West Lafayette, IN | | | |

| Monday, 4 January 2016 | | | | | | |
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| **63-APA-6/FD-7** | **Special Session: Advances in Fundamental Unsteady Low Reynolds Number Flows AVT-202** | | | | | **Coronado D** |
| Chaired by: H. BABINSKY, University of Cambridge and M. OL, US Air Force Reseach Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-0285<br>**Unsteady Flat Plates: a Cursory Review (Invited - AVT202 special session)**<br>M. Ol, Air Force Research Laboratory, Wright-Patterson AFB, OH; H. Babinsky, Cambridge University, Cambridge, United Kingdom | 1430 hrs<br>AIAA-2016-0286<br>**Low Reynolds Number Acceleration of Flat Plate Wings at High Incidence (Invited).**<br>R. Stevens, H. Babinsky, University of Cambridge, Cambridge, United Kingdom; F. Manar, P. Mancini, A. Jones, University of Maryland, College Park, College Park, MD; K. Granlund, North Carolina State University, Raleigh, NC; et al. | 1500 hrs<br>AIAA-2016-0287<br>**Unsteady Aerodynamics of Pitching Low Aspect Ratio Wings: A review of AVT-202-panel results (Invited Paper)**<br>L. Bernal, University of Michigan, Ann Arbor, Ann Arbor, MI | 1530 hrs<br>AIAA-2016-0288<br>**Leading Edge Vortex Evolution and Lift Production on Rotating Wings (Invited)**<br>A. Jones, F. Manar, University of Maryland, College Park, College Park, MD; N. Phillips, T. Nakata, R. Bomphrey, University of London, Hatfield, United Kingdom; M. Ringuette, State University of New York, Buffalo, NY; et al. | 1600 hrs<br>AIAA-2016-0289<br>**Parametric Variations in Aspect Ratio, Leading Edge and Planform Shapes for the Rectilinear Pitch Cases of AVT-202 (Invited)**<br>O. Son, O. Cetiner-Yildirim, Istanbul Technical University, Istanbul, Turkey; R. Stevens, H. Babinsky, Cambridge University, Cambridge, United Kingdom; F. Manar, P. Mancini, University of Maryland, College Park, College Park, MD; et al. | 1630 hrs<br>AIAA-2016-0290<br>**Low Order Modelling of Lift Forces for Unsteady Pitching and Surging Wings.**<br>H. Babinsky, R. Stevens, University of Cambridge, Cambridge, United Kingdom; A. Jones, University of Maryland, College Park, College Park, MD; L. Bernal, University of Michigan, Ann Arbor, Ann Arbor, MI; M. Ol, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1700 hrs<br>**Next Steps in the Fundamentals of Highly Unsteady Aerodynamics** |

| Monday, 4 January 2016 | | | | | | |
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| **64-APA-7** | **Aerodynamic Design: Analysis, Methodologies, and Optimization Techniques I** | | | | | **Americas Cup B** |
| Chaired by: J. AZEVEDO and P. ANSELL, University of Illinois at Urbana-Champaign | | | | | | |
| 1400 hrs<br>AIAA-2016-0291<br>**Using A Fast and Explicit Mesh Movement Method To Efficiently Compute Mesh Sensitivity**<br>G. Mura, B. Hinchliffe, N. Qin, University of Sheffield, Sheffield, United Kingdom; J. Brezillon, Airbus, Toulouse, France | 1430 hrs<br>AIAA-2016-0292<br>**An Evaluation of Aerodynamic Analysis Software for use in Aircraft MDO**<br>C. Meckstroth, University of Dayton Research Institute, Dayton, OH | 1500 hrs<br>AIAA-2016-0293<br>**Computational Analysis and Optimization of Blockerless Engine Thrust Reverser Concept**<br>P. Rajput, I. Kalkhoran, New York University, Brooklyn, NY | 1530 hrs<br>AIAA-2016-0294<br>**Variable-Fidelity Surrogate Modeling of Lambda Wing Transonic Aerodynamic Performance**<br>D. Bryson, M. Rumpfkeil, University of Dayton, Dayton, OH | 1600 hrs<br>AIAA-2016-0295<br>**Parametric Study of the Effects of a Tubercle's Geometry on Wing Performance Through the Use of the Lifting-Line Theory**<br>M. Bolzon, R. Kelso, M. Arjomandi, University of Adelaide, Adelaide, Australia | 1630 hrs<br>AIAA-2016-0296<br>**Least Squares Shadowing Sensitivity Analysis of Chaotic Flow around a Two-Dimensional Airfoil**<br>P. Blonigan, Q. Wang, Massachusetts Institute of Technology, Cambridge, MA; E. Nielsen, NASA Langley Research Center, Hampton, VA; B. Diskin, National Institute of Aerospace, Hampton, VA | 1700 hrs<br>AIAA-2016-0297<br>**An Optimization Approach to Split-Winglet Design for Sailplanes**<br>T. Krebs, G. Bramesfeld, Ryerson University, Toronto, Canada |

| Monday, 4 January 2016 | | | | | | |
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| **65-APA-8** | **Special Session: Simulation of Rotor in Hover II** | | | | | **Coronado E** |
| Chaired by: R. NARDUCCI, Boeing Defense, Space & Security and N. HARIHARAN, CREATE-AV | | | | | | |
| 1400 hrs<br>AIAA-2016-0298<br>**Performance Impact of Tip Shape Variations on the S-76 Rotor Using KCFD**<br>J. Abras, Naval Air Systems Command, Patuxent River, MD; N. Hariharan, CREATE AV Team, Lorton, VA | 1430 hrs<br>AIAA-2016-0299<br>**Hover Predictions of the S-76 Rotor using HMB2 - Model to full Scale**<br>G. Barakos, A. Jimenez-Garcia, University of Liverpool, Liverpool, United Kingdom | 1500 hrs<br>AIAA-2016-0300<br>**A Comparative Study of Two Hover Prediction Methodologies**<br>R. Eshcol, CD-adapco, Orlando, FL; C. Zhou, J. Kim, L. Sankar, Georgia Institute of Technology, Atlanta, GA | 1530 hrs<br>AIAA-2016-0301<br>**Parametric Validation Study for a Hovering Rotor using UT-GENCAS**<br>B. Min, B. Wake, United Technologies Corporation, East Hartford, CT | 1600 hrs<br>AIAA-2016-0302<br>**Performance and Physics of a S-76 Rotor in Hover With Non-Contiguous Hybrid Methodologies**<br>K. Jacobson, A. Grubb, M. Smith, Georgia Institute of Technology, Atlanta, GA | 1630 hrs<br>AIAA-2016-0303<br>**Investigations of XV-15 Rotor Hover Performance and Flow Field Using U²NCLE and HELIOS Codes**<br>C. Sheng, Q. Zhao, University of Toledo, Toledo, OH; M. Hill, Bell Helicopter Textron, Inc., Fort Worth, TX | 1700 hrs<br>Oral Presentation<br>**NASA Hover Tests: Overview and Plans**<br>T. Norman, NASA Ames Research Center, Moffett Field, CA; L. Jenkins, S. Gorton, NASA Langley Research Center, Hampton, VA |

| Monday, 4 January 2016 | | | | | | |
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| **66-APA-9** | **High Angle of Attack and High Lift Aerodynamics** | | | | | **Americas Cup C** |
| Chaired by: J. MURRAY, Sandia National Laboratories and A. SCLAFANI, Boeing Commercial Airplanes | | | | | | |
| 1400 hrs<br>AIAA-2016-0304<br>**Numerical Simulations of Streamwise Vortices on a Generic High-Lift Configuration**<br>T. Landa, R. Radespiel, Technical University of Braunschweig, Braunschweig, Germany; J. Wild, German Aerospace Center (DLR), Braunschweig, Germany | 1430 hrs<br>AIAA-2016-0305<br>**Prediction of Buffet Loads of F-15 with FUN3D Solver**<br>S. Yang, P. Chen, ZONA Technology, Inc., Scottsdale, AZ; X. Wang, M. Mignolet, Arizona State University, Tempe, AZ; D. Pitt, J. Loyet, The Boeing Company, St. Louis, MO | 1500 hrs<br>AIAA-2016-0306<br>**Prediction of Post-Stall Aerodynamic Characteristics of wing(s) with separated flow modeled as a Single Nascent Vortex**<br>A. Samuel, R. Mukherjee, Indian Institute of Technology Madras, Chennai, India | 1530 hrs<br>AIAA-2016-0307<br>**Frequency Response Measurements of Flapped Airfoil at High Angles of Attack**<br>M. Zakaria, M. Hajj, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1600 hrs<br>AIAA-2016-0308<br>**Development of the High Lift Common Research Model (HL-CRM): A Representative High Lift Configuration for Transonic Transports**<br>D. Lacy, The Boeing Company, Seattle, WA; A. Sclafani, The Boeing Company, Long Beach, CA | | |

| Monday, 4 January 2016 | | | | | | |
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| **67-APA-10** | **Test and Prediction Techniques for High-speed Flows** | | | | | **Americas Cup D** |
| Chaired by: X. WANG, Air Force Research Laboratory and C. TILMANN, Air Force Research Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-0309<br>**Effect of Canard Deflection for Roll Control on Fin Performance of a Fin-Stabilized Projectile**<br>S. Silton, Army Research Laboratory, Aberdeen Proving Ground, MD; C. Coyle, U.S. Military Academy, West Point, NY | 1430 hrs<br>AIAA-2016-0310<br>**Computational Analysis, Model Reduction, and Experimental Comparison of Model Scale Impinging Jets**<br>A. Crowell, Naval Air Systems Command, Patuxent River, MD; L. Myers, Pennsylvania State University, University Park, PA | 1500 hrs<br>AIAA-2016-0311<br>**Evaluation of Dynamic Pressure-Sensitive Paint for Improved Analysis of Cavity Flows and CFD Validation**<br>D. Roberts, N. Stokes, Aircraft Research Association Ltd., Bedford, United Kingdom; M. Quinn, University of Manchester, Manchester, United Kingdom; J. Coppin, T. Birch, DSTL, Portsmouth, United Kingdom | 1530 hrs<br>AIAA-2016-0312<br>**The Incoming Flow Investigation around Geometric Elements in Hypersonic Shock Tube.**<br>M. Kotov, I. Kryukov, L. Ruleva, S. Solodovnikov, S. Surzhikov, Russian Academy of Sciences, Moscow, Russia | 1600 hrs<br>AIAA-2016-0313<br>**Temperature Measurements by Temperature Sensitive Paint on Flexible and Deforming Body in Hypersonic Flow**<br>M. Taguchi, R. Maruyama, K. Mori, Nagoya University, Nagoya, Japan | | |

| Monday, 4 January 2016 | | | | | | |
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| **68-ASC-1** | **EU FP7 CHANGE (Special Session)** | | | | | **Gaslamp D** |
| Chaired by: R. DE BREUKER, TU Delft and R. BARRETT-GONZALEZ, The University of Kansas | | | | | | |
| 1400 hrs<br>AIAA-2016-0314<br>**MDAO for Aerodynamic Assessment of a Morphed Wing for the Loiter Segment of a UAV Flight Mission**<br>Y. Yang, S. Ozgen, Y. Yaman, Middle East Technical University, Ankara, Turkey; A. Ciarella, M. Hahn, Aircraft Research Association Ltd., Bedford, United Kingdom; C. Beaverstock, Swansea University, Swansea, United Kingdom; et al. | 1430 hrs<br>AIAA-2016-0315<br>**Design and Experiments of a Warp Induced Camber and Twist Morphing Leading and Trailing Edge Device**<br>N. Werter, J. Sodja, G. Spirlet, R. De Breuker, Delft University of Technology, Delft, The Netherlands | 1500 hrs<br>AIAA-2016-0316<br>**A Hybrid Morphing Trailing Edge Designed for Camber Change of the Control Surface**<br>I. Tunçöz, Y. Yang, E. Gürses, M. Sahin, Y. Yaman, S. Ozgen, Middle East Technical University, Ankara, Turkey | 1530 hrs<br>AIAA-2016-0317<br>**Telescopic Wing-Box for a Morphing Wing**<br>P. Gamboa, P. Santos, University of Beira Interior, Covilha, Portugal | 1600 hrs<br>AIAA-2016-0318<br>**From development of multi-material skins to morphing flight hardware production**<br>A. Falken, S. Steeger, O. Heintze, INVENT GmbH, Braunschweig, Germany; R. De Breuker, Delft University of Technology, Delft, The Netherlands | | |

| Monday, 4 January 2016 | | | | | | |
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| **69-FD-8** | **Airfoil Flow Control** | | | | | **Cove** |
| Chaired by: D. RIZZETTA and J. FARNSWORTH, University of Colorado Boulder | | | | | | |
| 1400 hrs<br>AIAA-2016-0319<br>**Open-Loop and Closed-Loop Trailing-Edge Separation Control on a Natural Laminar Flow Airfoil**<br>R. Gupta, P. Ansell, University of Illinois, Urbana-Champaign, Urbana, IL | 1430 hrs<br>AIAA-2016-0320<br>**Aero-Servo-Elastic Control of a Cyber-Physical FlexibleWing**<br>C. Fagley, J. Seidel, T. McLaughlin, U.S. Air Force Academy, Colorado Springs, CO; J. Farnsworth, University of Colorado, Boulder, Boulder, CO | 1500 hrs<br>AIAA-2016-0321<br>**Aerodynamic Control of a Dynamically Pitching VR-12 Airfoil using Discrete Pulsed Actuation**<br>Y. Tan, T. Crittenden, A. Glezer, Georgia Institute of Technology, Atlanta, GA | 1530 hrs<br>AIAA-2016-0322<br>**Control Strategies for a Laminar-Flow Compatible High-Lift Wing Configuration**<br>D. Rizzetta, M. Visbal, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1600 hrs<br>AIAA-2016-0323<br>**Effet of Oscillating Winglet on the Development of Wing-Tip Vortex**<br>T. Guha, R. Kumar, Florida State University, Tallahassee, FL | 1630 hrs<br>AIAA-2016-0324<br>**Flow Seperation and Passive Flow Control on E387 Airfoil**<br>A. Heffron, J. Williams, E. Avital, Queen Mary University of London, London, United Kingdom | 1700 hrs<br>AIAA-2016-0325<br>**An Experimental Study of Mini-Tabs for Aerodynamic Load Control**<br>D. Heathcote, I. Gursul, D. Cleaver, University of Bath, Bath, United Kingdom |

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| **70-FD-9** | **CFD Simulation of Vortex Flows** | | | | | **Pier** |
| Chaired by: S. KARMAN, Pointwise, Inc. and D. GARMANN, Air Force Research Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-0326<br>**Analysis on Λ-vortex development in a transitional boundary layer**<br>Y. Wang, S. Chern, Y. Dong, C. Liu, University of Texas, Arlington, Arlington, TX | 1430 hrs<br>AIAA-2016-0327<br>**DNS Study on Motion around a Vortex Ring in Transitional Boundary Layers**<br>Y. Wang, S. Chern, Y. Yang, C. Liu, University of Texas, Arlington, Arlington, TX | 1500 hrs<br>AIAA-2016-0328<br>**Unsteady Evolution of the Tip Vortex on a Stationary and Oscillating NACA0012 Wing**<br>D. Garmann, M. Visbal, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1530 hrs<br>AIAA-2016-0329<br>**CFD Simulations of the ERICA tiltrotor using HMB2**<br>A. Jimenez-Garcia, G. Barakos, University of Liverpool, Liverpool, United Kingdom | 1600 hrs<br>AIAA-2016-0330<br>**Transient Laminar Cross-Flow over a Rigid Cantilever Plate**<br>N. DiZinno, G. Vradis, NYU Polytechnic School of Engineering, Brooklyn, NY | 1630 hrs<br>AIAA-2016-0331<br>**Numerical Investigation of Low-Pressure Turbine Endwall Flows**<br>A. Gross, S. Romero, New Mexico State University, Las Cruces, NM; C. Marks, R. Sondergaard, Air Force Research Laboratory, Wright-Patterson AFB, OH | |

| Monday, 4 January 2016 | | | | | | |
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| **71-FD-11** | **Compressible Boundary Layers** | | | | | **Harbor D** |
| Chaired by: S. GORDEYEV, University of Notre Dame and L. AGOSTINI, The Ohio State University | | | | | | |
| 1400 hrs<br>AIAA-2016-0332<br>**Shock Wave Boundary Layer Interaction Control using Repetitive-Pulse Laser Energy Depositions**<br>A. Iwakawa, T. Tamba, S. Pham, T. Shoda, A. Sasoh, Nagoya University, Nagoya, Japan | 1430 hrs<br>AIAA-2016-0333<br>**CFD Investigation of Supersonic Bleed with Discretely Modeled Holes in Cambridge Wind Tunnel**<br>S. Duncan, P. Orkwis, M. Ugolotti, University of Cincinnati, Cincinnati, OH | 1500 hrs<br>AIAA-2016-0334<br>**Entropy Generation and Transport Mechanism in Compressible Mixing Layer: A Direct Numerical Study**<br>K. Shi, S. Morris, A. Jemcov, University of Notre Dame, Notre Dame, IN | 1530 hrs<br>AIAA-2016-0335<br>**Causal relationship between large outer structures and small-scale near-wall turbulence in a compressible boundary layer at Mach=2.3**<br>L. Agostini, Ohio State University, Columbus, OH; M. Leschziner, Imperial College London, London, United Kingdom; J. Poggie, N. Bisek, Air Force Research Laboratory, Wright-Patterson AFB, OH; D. Gaitonde, Ohio State University, Columbus, OH | | | |

| Monday, 4 January 2016 | | | | | | |
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| **72-FD-12** | **DNS/LES Techniques** | | | | | **Harbor E** |
| Chaired by: F. SCHRANNER and M. RAI, NASA-Ames Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0336<br>**Significance of Computational Spanwise Domain Length on LES for the Flowfield with Large Vortex Structure**<br>H. Fukumoto, University of Tokyo, Bunkyo, Japan; H. Aono, Tokyo University of Science, Katsushika, Japan; T. Nonomura, A. Oyama, K. Fujii, Institute of Space and Astronautical Science, Sagamihara, Japan | 1430 hrs<br>AIAA-2016-0337<br>**Utilizing Direct Numerical Simulations of Transition and Turbulence in Design Optimization**<br>M. Rai, NASA Ames Research Center, Moffett Field, CA | 1500 hrs<br>AIAA-2016-0338<br>**Optimization of an Implicit LES Method for Underresolved Simulations of Incompressible Flows**<br>F. Schranner, V. Rozov, N. Adams, Technical University of Munich, Munich, Germany | 1530 hrs<br>AIAA-2016-0339<br>**Validation of a Window-Embedded RANS/LES Method Based on Synthetic Turbulence**<br>Z. Li, H. Chen, Y. Zhang, Tsinghua University, Beijing, China | 1600 hrs<br>AIAA-2016-0340<br>**Turbulent Inflow Generation for the Large-eddy Simulation Technique Through Globally Neutral Buoyancy Perturbations**<br>C. Umphrey, I. Senocak, Boise State University, Boise, ID | 1630 hrs<br>AIAA-2016-0341<br>**Large Eddy Simulation based on Residual-based Variational Multiscale Method and Lagrangian Dynamic Smagorinsky Model**<br>S. Tran, O. Sahni, Rensselaer Polytechnic Institute, Troy, NY | |

| Monday, 4 January 2016 | | | | | | |
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| **73-FD-13** | **Jet Flows I** | | | | | **Promenade B** |
| Chaired by: R. WOSZIDLO, The Boeing Company | | | | | | |
| 1400 hrs<br>AIAA-2016-0342<br>**Comparison between LES and experimental round jet for diesel fuel spray**<br>J. Brulatout, F. Garnier, P. Seers, University of Québec, Montréal, Canada | 1430 hrs<br>AIAA-2016-0343<br>**Computational Methodology for Investigating the Transient Interaction Between a Reaction Control Jet and a Hypersonic Crossflow**<br>W. Miller, P. Medwell, M. Kim, University of Adelaide, Adelaide, Australia; C. Doolan, University of New South Wales, Sydney, Australia | 1500 hrs<br>AIAA-2016-0344<br>**Numerical Simulation of Jet Mixing in a Recessed Coaxial Injector at Supercritical Pressure**<br>D. Muto, Kyushu Institute of Technology, Kitakyushu, Japan; H. Terashima, University of Tokyo, Tokyo, Japan; N. Tsuboi, Kyushu Institute of Technology, Kitakyushu, Japan | 1530 hrs<br>AIAA-2016-0345<br>**The Time-Resolved Flow Field of a Jet Emitted by a Fluidic Oscillator into a Crossflow**<br>F. Ostermann, Technical University of Berlin, Berlin, Germany; R. Woszidlo, University of Kansas, Lawrence, Lawrence, KS; C. Nayeri, C. Paschereit, Technical University of Berlin, Berlin, Germany | | | |

| Monday, 4 January 2016 | | | | | | |
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| **74-FD-14** | **Shock Boundary Layer Interaction II** | | | | | **Harbor F** |
| Chaired by: J. BENEK, Air Force Research Lab AFRL/RQ and A. GROSS, New Mexico State University | | | | | | |
| 1400 hrs<br>AIAA-2016-0346<br>**New LES of a Hypersonic Shock/ Turbulent Boundary Layer Interaction**<br>C. Helm, M. Martin, University of Maryland, College Park, College Park, MD | 1430 hrs<br>AIAA-2016-0347<br>**Numerical Investigation of Shock Boundary-Layer Interactions**<br>A. Gross, New Mexico State University, Las Cruces, NM; H. Fasel, University of Arizona, Tucson, Tucson, AZ | 1500 hrs<br>AIAA-2016-0348<br>**Experimental Study of the Three-Dimensionality of Shock Wave-Boundary Layer Interactions in Rectangular Inlets**<br>I. Grossman, P. Bruce, Imperial College London, London, United Kingdom | 1530 hrs<br>AIAA-2016-0349<br>**Simulation of Hypersonic Shock Wave Laminar Boundary Layer Interaction on Hollow Cylinder Flare**<br>N. Kianvashrad, D. Knight, Rutgers, The State University of New Jersey, New Brunswick, NJ | 1600 hrs<br>AIAA-2016-0350<br>**Assessment of CFD Capability for Hypersonic Shock Wave Boundary Layer Interactions, Part II**<br>M. Rouhi Youssefi, D. Knight, Rutgers, The State University of New Jersey, Piscataway, NJ | 1630 hrs<br>AIAA-2016-0351<br>**Shock Wave Boundary Layer Interaction in a Hypersonic Laminar Flow on a Hollow Cylinder Flare**<br>M. Mortazavi, D. Knight, Rutgers, The State University of New Jersey, New Brunswick, NJ | 1700 hrs<br>AIAA-2016-0352<br>**Simulations of Incident Shock Boundary Layer Interactions**<br>J. Benek, C. Suchyta, Air Force Research Laboratory, Wright-Patterson AFB, OH; H. Babinsky, University of Cambridge, Cambridge, United Kingdom |

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| **75-FD-20** | **Stability and Transition of Hypersonic Flows I** | | | | | **Promenade A** |
| Chaired by: M. BORG, Air Force Research Laboratory and M. KEGERISE, NASA-Langley Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0353<br>**Direct Numerical Simulation of Crossflow Instability Excited by Microscale Roughness on HIFiRE-5**<br>D. Dinzl, G. Candler, University of Minnesota, Twin Cities, Minneapolis, MN | 1430 hrs<br>AIAA-2016-0354<br>**Simultaneous Infrared and Pressure Measurements of Crossflow Instability Modes for HIFiRE-5**<br>M. Borg, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1500 hrs<br>AIAA-2016-0355<br>**Instability and Transition Experiments in the Boeing/AFOSR Mach-6 Quiet Tunnel**<br>C. Sweeney, B. Chynoweth, J. Edelman, S. Schneider, Purdue University, West Lafayette, IN | 1530 hrs<br>AIAA-2016-0356<br>**Traveling Crossflow Wave Predictions on the HIFiRE-5 at Mach 6: Stability Analysis vs. Quiet Tunnel Data**<br>M. Lakebrink, The Boeing Company, St. Louis, MO; M. Borg, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1600 hrs<br>AIAA-2016-0357<br>**Unsteady Heat-Flux Measurements of Second-Mode Instability Waves in a Hypersonic Boundary Layer**<br>M. Kegerise, S. Rufer, NASA Langley Research Center, Hampton, VA | 1630 hrs<br>AIAA-2016-0358<br>**Visualization of Hypersonic Boundary Layer Transition on Elliptic Cone in High Enthalpy Shock Tunnel with Temperature-Sensitive Paint**<br>T. Nagayama, H. Nagai, Tohoku University, Sendai, Japan; H. Tanno, T. Komuro, Japan Aerospace Exploration Agency (JAXA), Kakuda, Japan | |

| Monday, 4 January 2016 | | | | | | |
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| **76-GNC-6** | **Control Theory and Applications** | | | | | **Hillcrest A** |
| Chaired by: M. SORGENFREI, NASA Ames Research Center and J. ROGERS, Georgia Institute of Technology | | | | | | |
| 1400 hrs<br>AIAA-2016-0359<br>**Robust Hover Mode Control of a Tiltrotor Using Nonlinear Control Technique**<br>M. Alam, Czech Technical University in Prague, Prague, Czech Republic; S. Celikovsky, Czech Academy of Sciences, Prague, Czech Republic; D. Walker, University of Liverpool, Liverpool, United Kingdom | 1430 hrs<br>AIAA-2016-0360<br>**An Incremental Approximate Dynamic Programming Flight Controller Based on Output Feedback**<br>Y. Zhou, E. Van Kampen, Q. Chu, Delft University of Technology, Delft, The Netherlands | 1500 hrs<br>AIAA-2016-0361<br>**Observer-Based Sequential Control of a Two Time Scale Spring-Mass-Damper System**<br>D. Saha, J. Valasek, Texas A&M University, College Station, TX | 1530 hrs<br>AIAA-2016-0362<br>**Robust Control of Uncertain Linear Input-Delayed Sampled Data System Through Use of Optimization Scheme and Robust Stability Bound**<br>J. Kratz, R. Yedavalli, Ohio State University, Columbus, OH | 1600 hrs<br>AIAA-2016-0363<br>**Hardening Control Systems with the ICAR Loop**<br>H. Sells, DESE Research, Inc., Huntsville, AL | 1630 hrs<br>AIAA-2016-0364<br>**Modified Extended State Observer Control of Linear Systems**<br>C. Heise, S. Schatz, F. Holzapfel, Technical University of Munich, Munich, Germany | 1700 hrs<br>AIAA-2016-0365<br>**Handling Hidden Coupling Terms in Gain-Sheduling Control Design: Application to a Pitch-Axis Missile Autopilot**<br>H. Lhachemi, D. Saussié, G. Zhu, Defense Research and Development Canada, Montréal, Canada |

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| **77-GNC-7** | **Spacecraft Attitude Control II** | | | | | **Hillcrest B** |
| Chaired by: E. MOOIJ, Delft Technical University of Technology and R. HALL | | | | | | |
| 1400 hrs<br>AIAA-2016-0366<br>**Flexible GN&C architecture enables an innovative control solution to repurpose the Kepler Space Telescope**<br>D. Putnam, D. Wiemer, I. Gravseth, Ball Aerospace & Technologies Corporation, Boulder, CO | 1430 hrs<br>AIAA-2016-0367<br>**Recovery of an Uncontrolled, Asymmetric Spacecraft with Limited Controls**<br>M. Coen, J. Valasek, Texas A&M University, College Station, TX | 1500 hrs<br>AIAA-2016-0368<br>**A Bang-Bang Attitude Stabilizer for Rotating Rigid Bodies**<br>E. Serpelloni, M. Maggiore, C. Damaren, University of Toronto, Toronto, Canada | 1530 hrs<br>AIAA-2016-0369<br>**Deterministic Drift Counteraction Optimal Control for Attitude Control of Spacecraft with Time-Varying Mass**<br>R. Zidek, I. Kolmanovsky, University of Michigan, Ann Arbor, Ann Arbor, MI | 1600 hrs<br>AIAA-2016-0370<br>**Almost Global Stochastic Stabilization of Attitude Motion with Unknown Multiplicative Diffusion Coefficient**<br>E. Samiei, New Mexico State University, Las Cruces, NM; A. Sanyal, Syracuse University, Syracuse, NY; E. Butcher, University of Arizona, Tucson, AZ | 1630 hrs<br>AIAA-2016-0371<br>**Solving Polynomial Optimal Control Problems via Iterative Convex Optimization**<br>C. Sun, R. Dai, P. Lu, Iowa State University, Ames, IA | |

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| **78-GNC-8** | **Invited Session: LOC-2, Onboard Systems for LOC Prevention and Recovery – Real-Time Failure Detection, Isolation, and Redundancy Management** | | | | | **Coronado B** |
| Chaired by: C. BELCASTRO, NASA-Langley Research Center and D. CRIDER, National Transportation Safety Board | | | | | | |
| 1400 hrs<br>AIAA-2016-0372<br>**Aircraft Fault Detection Using Real-Time Frequency Response Estimation**<br>J. Grauer, NASA Langley Research Center, Hampton, VA | 1430 hrs<br>AIAA-2016-0373<br>**Aircraft Actuator Fault Detection and Isolation using Piecewise Constant Fault Estimation Scheme**<br>H. Lee, S. Snyder, A. Patterson, N. Hovakimyan, University of Illinois, Urbana-Champaign, Urbana, IL | 1500 hrs<br>AIAA-2016-0374<br>**Aerodynamic Modeling from Flight Data with Unknown Time Skews**<br>E. Morelli, NASA Langley Research Center, Hampton, VA | 1530 hrs<br>AIAA-2016-0375<br>**An Innovative Approach to Air Data Sensor FDIR for Commercial Aircraft**<br>J. Boskovic, J. Jackson, Scientific Systems Company, Inc., Woburn, MA | 1600 hrs<br>AIAA-2016-0376<br>**Virtual Redundancy for Safety Assurance in the Presence of Sensor Failures**<br>M. Devore, N. Gandhi, A. Bateman, Barron Associates, Inc., Charlottesville, VA | | |

| Monday, 4 January 2016 | | | | | | |
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| **79-GNC-9** | **Invited Session: EDL-2, Entry, Descent and Landing GN&C Technology II** | | | | | **Coronado A** |
| Chaired by: J. CARSON, NASA Jet Propulsion Laboratory and B. ACIKMESE, University of Texas at Austin | | | | | | |
| 1400 hrs<br>AIAA-2016-0377<br>**Verification of a Fully Numerical Entry Guidance Algorithm**<br>P. Lu, Iowa State University, Ames, IA; C. Brunner, Odyssey Space Research, LLC, Houston, TX; S. Stachowiak, G. Mendeck, M. Tigges, C. Cerimele, NASA Johnson Space Center, Houston, TX | 1430 hrs<br>AIAA-2016-0378<br>**A Convex Formulation for the Minimum Fuel Powered-Descent Guidance Problem with Drag, Nonlinear State Constraints, and Free Final Time**<br>M. Szmuk, B. Acikmese, University of Texas, Austin, Austin, TX | 1500 hrs<br>AIAA-2016-0379<br>**Design and Analysis of Map Relative Localization for Access to Hazardous Landing Sites on Mars**<br>A. Johnson, Y. Cheng, J. Montgomery, N. Trawny, B. Tweddle, J. Zheng, California Institute of Technology, Pasadena, CA | | | | |

| Monday, 4 January 2016 | | | | | | |
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| **80-GNC-10** | **Aerospace Robotics and Unmanned/Autonomous Systems II** | | | | | **Hillcrest C** |
| Chaired by: S. ULRICH, Carleton University and T. BOGE, DLR GSOC | | | | | | |
| 1400 hrs<br>AIAA-2016-0380<br>**Trajectory Transcriptions for Potential Autonomy Features in UAV Maneuvers**<br>C. Ashokkumar, G. York , U.S. Air Force Academy, Colorado Springs, CO | 1430 hrs<br>AIAA-2016-0381<br>**Unifying Artificial Intelligence and Trajectory Optimization for UAV Guidance**<br>R. Cowlagi, J. Sperry, Worcester Polytechnic Institute, Worcester, MA | 1500 hrs<br>AIAA-2016-0382<br>**Landmark-Aided Navigation for Air Vehicles Using Learned Object Detectors**<br>M. DeAngelo, J. Horn, Pennsylvania State University, University Park, PA | 1530 hrs<br>AIAA-2016-0383<br>**Optimal Flight Paths in Wireless Sensor Networks: Modeling, Simulation, and Flight Test**<br>N. Jodeh, R. Cobb, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1600 hrs<br>AIAA-2016-0384<br>**Bio-inspired Time-to-contact Control for Autonomous Quadrotor Vehicles**<br>B. Thomsen, M. Zhang, I. Sharf, McGill University, Montréal, Canada | 1630 hrs<br>AIAA-2016-0385<br>**A Comparison between Trajectory Optimization Methods: Differential Dynamic Programming and Pseudospectral Optimal Control**<br>M. Gandhi, E. Theodorou, Georgia Institute of Technology, Atlanta, GA | |

| Monday, 4 January 2016 | | | | | | |
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| **81-GT-2** | **SAMURAI - Testing and Simulation of Real Engine Flows II (Invited)** | | | | | **Hillcrest D** |
| Chaired by: J. QUEST, ETW GmbH and T. WADHAMS, CUBRC | | | | | | |
| 1400 hrs<br>AIAA-2016-0386<br>**Image Base Fan Blade Deformation Measurements on an Airbus A320 V2500 Engine in Ground Operation**<br>T. Kirmse, P. Ebel, A. Schroeder, German Aerospace Center (DLR), Göttingen, Germany | 1430 hrs<br>AIAA-2016-0387<br>**Structural Modelling and Validation of a V2500 Honeycomb Core Fan Blade**<br>P. Ebel, R. Schnell, D. Schönweitz, T. Kirmse, German Aerospace Center (DLR), Stuttgart, Germany | 1500 hrs<br>AIAA-2016-0388<br>**Engine performance simulation of the integrated V2527 - Engine Fan**<br>F. Wolters, R. Becker, R. Schnell, P. Ebel, German Aerospace Center (DLR), Cologne, Germany | 1530 hrs<br>AIAA-2016-0389<br>**Numerical Simulation of a Fully Integrated Engine Ground Test**<br>D. Keller, German Aerospace Center (DLR), Braunschweig, Germany | 1600 hrs<br>AIAA-2016-0390<br>**Hybrid RANS/CAA Computation of A320 V2527 Engine at Ground Operation**<br>A. Neifeld, R. Ewert, German Aerospace Center (DLR), Braunschweig, Germany | | |

| Monday, 4 January 2016 | | | | | | |
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| **82-GTE-3** | **Compression Systems I** | | | | | **Gaslamp C** |
| Chaired by: R. ANTHONY and K. SUDER, NASA Glenn Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0391<br>**A CFD Study and Performance Evaluation of Service-Run Variable Vanes in a High Pressure Compressor of a Turbofan Engine**<br>S. Li, R. Ramakrishnan, Delta Air Lines, Inc., Atlanta, GA | 1430 hrs<br>AIAA-2016-0392<br>**Improved Predictions of Transonic, Low Aspect Ratio, Axial Compressor Stage Performance and Tip Clearance Effects**<br>R. Howard, Air Force Research Laboratory, Wright-Patterson AFB, OH; S. Puterbaugh, Universal Technology Corporation, Dayton, OH | 1500 hrs<br>AIAA-2016-0393<br>**Computational Investigation of Upstream-Propagating Potential Disturbances in a Fan Stage**<br>K. Gordon, E. Jumper, A. Jemcov, K. Shi, University of Notre Dame, Notre Dame, IN | 1530 hrs<br>AIAA-2016-0394<br>**Pulsed-DC Plasma Actuator Characteristics and Application in Compressor Stall Control**<br>R. McGowen, T. Corke, E. Matlis, University of Notre Dame, Notre Dame, IN; R. Kaszeta, C. Gold, Creare, Inc., Hanover, NH | 1600 hrs<br>AIAA-2016-0395<br>**Computational Simulations of a Multi-stage Subsonic Research Compressor**<br>K. Sreenivas, R. Webster, E. Hereth, University of Tennessee, Chattanooga, Chattanooga, TN; N. Key, R. Berdanier, Purdue University, West Lafayette, IN | 1630 hrs<br>AIAA-2016-0396<br>**Effect of Vortex Ingestion on Transonic Fan Stability**<br>J. Page, Cambridge University, Cambridge, United Kingdom; P. Hield, Rolls-Royce Group plc, Bristol, United Kingdom; P. Tucker, Cambridge University, Cambridge, United Kingdom | 1700 hrs<br>AIAA-2016-0397<br>**Compressor integration study for a pulse detonation engine**<br>B. Saracoglu, von Kármán Institute for Fluid Dynamics, Rhode-Saint-Genèse, Belgium; G. Paniagua, Purdue University, West Lafayette, IN |

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| **83-IS-2** | **Intelligent and Adaptive Aerospace Control** | | | | | **Regatta B** |
| Chaired by: C. SABO, University of Cincinnati and A. YUCEL, Lockheed Martin Aeronautics | | | | | | |
| 1400 hrs<br>AIAA-2016-0398<br>**Demonstration Platform for Trajectory Planning of an Autonomous Nonholonomic Skid-Steer System for Investigating Spatial Phenomena**<br>G. Keller, S. Hening, S. Song, M. Teodorescu, University of California, Santa Cruz, Santa Cruz, CA; B. Guillaume, N. Nguyen, NASA Ames Research Center, Moffett Field, CA; et al. | 1430 hrs<br>AIAA-2016-0399<br>**Adaptive Estimation of Disturbance Torque for Orbiting Spacecraft Using Recursive Least Squares Method.**<br>S. Swei, N. Nguyen, NASA Ames Research Center, Moffett Field, CA | 1500 hrs<br>AIAA-2016-0400<br>**Adaptive Modal Identification and Flutter Suppression Control**<br>N. Nguyen, S. Swei, NASA Ames Research Center, Moffett Field, CA | 1530 hrs<br>AIAA-2016-0401<br>**A Zero Filter Augmentation for Robust Adaptive Control of Weakly Minimum Phase Finite-Dimensional Systems**<br>M. Balas, Embry-Riddle Aeronautical University, Daytona Beach, FL; S. Frost, NASA Ames Research Center, Moffett Field, CA | 1600 hrs<br>AIAA-2016-0402<br>**Post Loss-Of-Control Autonomous Recovery Flight Regimes Using Nonlinear Smooth Feedback Regulators and Neural Network with Nonlinear Observers**<br>J. Dongmo, JetMech.Inc., Parkville, MD | 1630 hrs<br>AIAA-2016-0403<br>**Quadcopter Obstacle Avoidance using Biomimetic Algorithms**<br>A. Simpson, C. Sabo, University of Sheffield, Sheffield, United Kingdom | 1700 hrs<br>AIAA-2016-0404<br>**Bio-Inspired Visual Navigation for a Quadcopter using Optic Flow**<br>C. Sabo, A. Cope, K. Gurney, E. Vasilaki, J. Marshall, University of Sheffield, Sheffield, United Kingdom |

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| **84-ISC-3** | **International Student Conference -Team Category** | | | | | **Torrey Hills B** |
| Chaired by: S. CORBETS, Lockheed Martin Corporation | | | | | | |
| 1400 hrs<br>AIAA-2016-0405<br>**L1A Turbine Flow Characterization in a Cascade Facility with a T-Bar Turbulence Generator**<br>G. Gutkin, G. Whitener, Y. Wu, K. Rouser, U.S. Air Force Academy, Colorado Springs, CO | 1430 hrs<br>AIAA-2016-0406<br>**Design of an Engine Air Particle Separator for Unmanned Aerial Vehicle Applications**<br>J. Wolf, E. Shelley, D. Stralka, Cleveland State University, Cleveland, OH | 1500 hrs<br>AIAA-2016-0407<br>**A Feasibility Experimanet of a Small Scale RTV-655 Cryogenic Liquid Container for Space Applications**<br>D. Pumroy, D. Williams, W. Parker, University of Memphis, Memphis, TN | 1530 hrs<br>AIAA-2016-0408<br>**Implementation of Flexible Matrix Composite Actuators into the eSPAARO Unmanned Air Vehicle**<br>N. Beaty, M. Burns, C. MacNeal, G. Mohan, K. Pyne, C. Weit, Virginia Polytechnic Institute and State University, Blacksburg, VA; et al. | | | |

| Monday, 4 January 2016 | | |
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| **85-ISC-4**<br>**1400 - 1530 hrs** | **ISC-Community Outreach Category** | **Torrey Hills A** |

*Atmospheric Teaching Experiment (ATex) - Year Four*
**Paul S. Kennedy, Elaine C. Khuu, Matt Turk**
Virginia Polytechnic Institute and State University

*A Highly Effective Rocket-Based Outreach Program for Youth STEM Engagement*
**AJ Pollard**
Auburn University

*Texas A&M Sigma Gamma Tau Community Outreach*
**Steven De Hoog, Michael Pierce, and Austin B. Probe**
Texas A&M University

*Daedalus Astronautics @ ASU: Outreach Program*
**Lauren Brunacini**
Arizona State University

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| **86-LEC-2**<br>**1400 - 1500 hrs** | **SCS Lecture** | **Harbor A** |

*Technology Development and Infusion for the James Webb Telescope Sun Shield*
**James Moore**
Division Vice President
ManTech (NeXolve)

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| **87-MAT-3** | **Materials Testing & Characterization I** | | | | | **Gaslamp B** |
| Chaired by: S. WANTHAL, The Boeing Company and J. RANSOM, NASA-Langley Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0409<br>**Investigating Sub-surface Microstructure in Fiber Reinforced Polymer Composites via X-Ray Tomography Characterization**<br>R. Agyei, B. Sharma, M. Sangid, Purdue University, West Lafayette, IN | 1430 hrs<br>AIAA-2016-0410<br>**Interpreting High Temperature Deformation Behavior of a Ceramic Matrix Composite via High Energy X-rays and Numerical Simulation**<br>A. Manero, S. Sofronsky, University of Central Florida, Orlando, FL; K. Artzt, S. Hackemann, J. Wischek, German Aerospace Center (DLR), Cologne, Germany; J. Okasinski, Argonne National Laboratory, Argonne, IL; et al. | 1500 hrs<br>AIAA-2016-0411<br>**Computationally Intelligent Image Processing Techniques for Crack Detection in Structural Components from Imaged Data**<br>D. Gillaugh, Air Force Research Laboratory, Wright-Patterson AFB, OH; J. Beck, Perceptive Engineering Analytics, Lino Lakes, MN; J. Brown, T. George, O. Scott-Emuakpor, C. Holycross, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1530 hrs<br>AIAA-2016-0412<br>**Real Time In-Situ Sensing of Damage Evolution in Carbon Nanotube-Polymer Nanocomposites under Impact Loading**<br>E. Sengezer, G. Seidel, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1600 hrs<br>AIAA-2016-0413<br>**Aircraft Tire Spin-Up Wear Analysis through Experimental Testing and Computational Modeling**<br>A. Zakrajsek, J. Childress, M. Bohun, U.S. Air Force, Wright-Patterson AFB, OH; S. Naboulsi, Air Force Research Laboratory, Wright-Patterson AFB, OH; R. Vogel, U.S. Air Force, Wright-Patterson AFB OH; N. Lindsey, Air Force Research Laboratory, Wright-Patterson AFB, OH; et al. | | |

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| **88-MDO-2** | **Design Space Exploration** | | | | | | **Balboa A** |
| Chaired by: T. TAKAHASHI, Arizona State University and B. STANFORD, NASA Langley Research Center | | | | | | | |
| 1400 hrs<br>AIAA-2016-0414<br>**An Evolutionary Multi-Architecture Multi-Objective Optimization Algorithm for Design Space Exploration**<br>C. Frank, R. Marlier, O. Pinon-Fischer, D. Mavris, Georgia Institute of Technology, Atlanta, GA | 1430 hrs<br>AIAA-2016-0415<br>**A Heuristic Approach to Finding the Preferred Design Variable Parameterization for Optimization**<br>J. Sinsay, Army Aviation and Missile Research Development and Engineering Center, Moffett Field, CA; J. Alonso, Stanford University, Stanford, CA | 1500 hrs<br>AIAA-2016-0416<br>**Comparison of Adaptive Design Space Exploration Methods Applied to S-Duct CFD Simulation**<br>A. Garbo, B. German, Georgia Institute of Technology, Atlanta, GA | 1530 hrs<br>AIAA-2016-0417<br>**Adaptive Model Refinement in Surrogate-based Multiobjective Optimization**<br>S. Chowdhury, Mississippi State University, Mississippi State, MS; A. Mehmani, Cornell University, Ithaca, NY; W. Tong, Syracuse University, Syracuse, NY; A. Messac, Mississippi State University, Mississippi State, MS | 1600 hrs<br>AIAA-2016-0418<br>**Rapid Multi-Objective Aerodynamic Design Using Co-Kriging and Space Mapping**<br>S. Koziel, Y. Tesfahunegn, Reykjavik University, Reykjavik, Iceland; A. Amrit, L. Leifsson, Iowa State University, Ames, IA | 1630 hrs<br>AIAA-2016-0419<br>**Multi-Fidelity Aerodynamic Shape Optimization Using Manifold Mapping**<br>J. Ren, L. Leifsson, Iowa State University, Ames, IA; S. Koziel, Y. Tesfahunegn, Reykjavik University, Reykjavik, Iceland | 1700 hrs<br>AIAA-2016-0420<br>**Aircraft Wing Optimization based on Computationally Efficient Gradient-Enhanced Ordinary Kriging Metamodel Building**<br>C. Mortished, J. Ollar, Altair Engineering, Inc., Leamington Spa, United Kingdom; V. Toropov, Queen Mary University of London, London, United Kingdom; J. Sienz, Swansea University, Swansea, United Kingdom |

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| **89-MST-3** | **Modeling and Simulation of Air Traffic Management II** | | | | | **Golden Hill A** |
| Chaired by: B. APONSO, NASA-Ames Research Center and S. BEARD, NASA-Ames Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0421<br>**Using Airport Fast-Time Simulation Models to Increase the Quality of Airport Capacity Utilization Studies**<br>C. Schinwald, Technical University of Munich, Garching, Germany; K. Plötner, Bauhaus Luftfahrt e.V., Ottobrunn, Germany; M. Hornung, Technical University of Munich, Garching, Germany | 1430 hrs<br>AIAA-2016-0422<br>**Global Simulation of Aviation Operations**<br>B. Sridhar, K. Sheth, NASA Ames Research Center, Moffett Field, CA; H. Ng, A. Morando, University of California, Santa Cruz, Moffett Field, CA; J. Li, SGT, Inc., Moffett Field, CA | 1500 hrs<br>AIAA-2016-0423<br>**Validation Study on Descent Trajectory Optimization and Scheduling Improvement using Actual Operation Data**<br>N. Takeichi, Tokyo Metropolitan University, Hino, Japan; J. Ishihara, Y. Abumi, Nagoya University, Nagoya, Japan | 1530 hrs<br>AIAA-2016-0424<br>**Simulation Approach to the Resilience Engineering Assessment of the ATM System in Crisis Scenarios**<br>A. Errico, E. Filippone, R. Palumbo, D. Pascarella, F. Gargiulo, Italian Aerospace Research Center (CIRA), Capua, Italy | 1600 hrs<br>AIAA-2016-0425<br>**Next Generation Flight Management System Simulator**<br>S. Park, V. Vaddi, J. Kwan, Optimal Synthesis, Inc., Los Altos, CA | 1630 hrs<br>AIAA-2016-0426<br>**A Self-Separation Algorithm for High-Density Air Corridor Allocated to Optimal Flight Trahectories**<br>Y. Nakamura, Electronic Navigation Research Institute, Chofu, Japan; N. Takeichi, Tokyo Metropolitan University, Hino, Japan | |

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| **90-NDA-1** | **Surrogate Modeling Approaches for Uncertainty Quantification and Reliability Estimation** | | | | | **Old Town B** |
| Chaired by: J. BROWN and R. GRANDHI, Wright State University | | | | | | |
| 1400 hrs<br>AIAA-2016-0427<br>**Sensitivity Analysis-Based Surrogate Modeling of Limit States**<br>Z. Hu, S. Mahadevan, Vanderbilt University, Nashville, TN | 1430 hrs<br>AIAA-2016-0428<br>**Engineering Design Exploration Utilizing Locally-Optimized Covariance Kriging**<br>D. Clark, H. Bae, Wright State University, Dayton, OH | 1500 hrs<br>AIAA-2016-0429<br>**A Set of Test Problems and Results in Assessing Method Performance for Calculating Low Probabilities of Failure**<br>V. Romero, L. Swiler, M. Ebeida, S. Mitchell, Sandia National Laboratories, Albuquerque, NM | 1530 hrs<br>AIAA-2016-0430<br>**Surrogate Modeling of Full-Field Pressure Measurements from Supersonic Wind Tunnel Experiments**<br>G. Bartram, R. Perez, Universal Technology Corporation, Dayton, OH; B. Smarslok, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1600 hrs<br>AIAA-2016-0431<br>**Application of Interval Predictor Models to Space Radiation Shielding**<br>L. Crespo, S. Kenny, D. Giesy, R. Norman, S. Blattnig, NASA Langley Research Center, Hampton, VA | 1630 hrs<br>AIAA-2016-0432<br>**A Comparison of Metamodeling Techniques via Numerical Experiments**<br>L. Crespo, S. Kenny, D. Giesy, NASA Langley Research Center, Hampton, VA | 1700 hrs<br>AIAA-2016-0433<br>**Sparse polynomial surrogates for aerodynamic computations with random inputs**<br>E. Savin, A. Resmini, J. Peter, ONERA, Châtillon, France |

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| **91-PANEL-2**<br>**1400 - 1600 hrs** | **Monday Afternoon Forum 360**<br><br>**Research Enabling and Enabled by a Cis-Lunar One-year Mission** | **Seaport F-G** |
| Moderator: Michael Moloney, Director for Space and Aeronautics Space Studies Board Aeronautics and Space Engineering Board, National Academies of Sciences, Engineering, and Medicine | | |

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| **92-PC-3** | **Combustion Diagnostics** | | | | | **Harbor B** |
| Chaired by: A. CASWELL and A. STEINBERG, University of Toronto | | | | | | |
| 1400 hrs<br>AIAA-2016-0434<br>**Measurements of Hydrocarbon Absorbance at High Temperatures and Pressures**<br>D. Maqbool, C. Cadou, University of Maryland, College Park, College Park, MD | 1430 hrs<br>AIAA-2016-0435<br>**Measurements of Turbulent Swirl Flame Dynamics in an Ethylene-fuelled Gas Turbine Model Combustor at Elevated Pressure**<br>I. Boxx, German Aerospace Center (DLR), Stuttgart, Germany; C. Carter, Air Force Research Laboratory, Wright-Patterson AFB, OH; K. Geigle, W. Meier, German Aerospace Center (DLR), Stuttgart, Germany | 1500 hrs<br>AIAA-2016-0436<br>**Evaluation of Gappy Proper Orthogonal Decomposition for Gas Turbine Combustor Flows**<br>P. Saini, Q. An, A. Steinberg, University of Toronto, Toronto, Canada | 1530 hrs<br>AIAA-2016-0437<br>**DSMC Simulations of a Photoionization Mass Spectrometer**<br>Q. Guan, G. Ellison, J. Daily, University of Colorado, Boulder, Boulder, CO; J. Stanton, University of Texas, Austin, Austin, TX; M. Ahmed, Lawrence Berkeley National Laboratory, Berkeley, CA | | | |

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| **93-PC-4** | **Detonations, Explosions, and Supersonic Combustion** | | | | | **Harbor C** |
| Chaired by: R. PITZ, Vanderbilt University and T. OMBRELLO, Air Force Research Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-0438<br>**Diffusion-Flame Ignition by Shock-Wave Impingement on a Hydrogen-Air Supersonic Mixing Layer**<br>A. Sanchez, C. Huete, F. Williams, University of California, San Diego, La Jolla, CA | 1430 hrs<br>AIAA-2016-0439<br>**Large-Eddy Simulation of Cheng's Supersonic Burner**<br>G. Ribert, L. Bouheraoua, P. Domingo, National Center for Scientific Research (CNRS), Rouen, France | 1500 hrs<br>AIAA-2016-0440<br>**Growth Rate and Flame Structure of Turbulent Premixed Flame Kernels in Supersonic Flows**<br>B. Ochs, D. Fries, D. Scarborough, S. Menon, Georgia Institute of Technology, Atlanta, GA | 1530 hrs<br>AIAA-2016-0441<br>**Investigation of Flame Structure and Combustion Dynamics using $CH_2O$ PLIF and High-Speed CH* Chemiluminescence in a Premixed Dual-Mode Scramjet Combustor**<br>P. Allison, K. Frederickson, Ohio State University, Columbus, OH; J. Kirik, R. Rockwell, University of Virginia, Charlottesville, Charlottesville, VA; W. Lempert, J. Sutton, Ohio State University, Columbus, OH | 1600 hrs<br>AIAA-2016-0442<br>**Effect of Elevated Mixture Pressure and Equivalence Ratio on Hydrogen-Air Detonation Cell Size**<br>C. Babbie, P. King, Air Force Institute of Technology, Wright-Patterson AFB, OH; J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; F. Schauer, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1630 hrs<br>AIAA-2016-0443<br>**Fluidic Jet Augmentation of a Deflagrated Turbulent Flame for Deflagration-to-Detonation**<br>J. Chambers, J. McGarry, K. Ahmed, University of Central Florida, Orlando, FL | |

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| **94-PC-5** | **High-Pressure Combustion, Fuel Technology** | | | | | **Cortez Hill C** |
| Chaired by: L. SMITH, United Technologies Research Center and K. MCMANUS, GE Global Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0444<br>**Numerical Simulations of Cool Flame Propagation Limits and Speeds at Elevated Pressures**<br>Y. Ju, C. Reuter, Princeton University, Princeton, NJ | 1430 hrs<br>AIAA-2016-0445<br>**Counterflow Analysis for Combustion at High Pressure**<br>A. Jorda Juanos, P. Popov, W. Sirignano, University of California, Irvine, Irvine, CA | 1500 hrs<br>AIAA-2016-0446<br>**Experimental Studies of a High-g Ultra-Compact Combustor at Elevated Pressures and Temperatures**<br>T. Erdmann, D. Burrus, Innovative Scientific Solutions, Inc., Dayton, OH; D. Shouse, J. Gross, C. Neuroth, A. Caswell, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1530 hrs<br>AIAA-2016-0447<br>**Low Temperature Autoignition Behavior of Surrogate Jet Fuels with Targeted Properties in a Rapid Compression Machine**<br>D. Valco, K. Min, A. Oldani, University of Illinois, Urbana-Champaign, Urbana, IL; J. Edwards, Air Force Research Laboratory, Wright-Patterson AFB, OH; T. Lee, University of Illinois, Urbana-Champaign, Urbana, IL | 1600 hrs<br>AIAA-2016-0448<br>**Fuel effects on the performance of a recirculation-zone supported burner**<br>V. Katta, Innovative Scientific Solutions, Inc., Dayton , OH; W. Roquemore, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1630 hrs<br>AIAA-2016-0449<br>**Quasi-State-Specific QCT Method for Calculating the Dissociation Rate of Nitrogen in Thermal Non-Equilibrium**<br>S. Voelkel, University of Texas, Austin, Austin, TX; V. Raman, University of Michigan, Ann Arbor, Ann Arbor, MI; P. Varghese, University of Texas, Austin, Austin, TX | 1700 hrs<br>AIAA-2016-0450<br>**Comparison of Alternative Jet Fuel Lean Blowouts for Bluff-Body Stabilized Flames**<br>B. Huelskamp, Innovative Scientific Solutions, Inc., Dayton, OH; J. Monfort, University of Dayton, Dayton, OH; B. Kiel, C. Neuroth, A. Caswell, Air Force Research Laboratory, Wright-Patterson AFB, OH |

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| **95-PDL-3** | **Plasma Based Flow Control** | | | | | **Ocean Beach** |
| Chaired by: T. MCLAUGHLIN, US Air Force Academy and J. POGGIE, Purdue University- Sch of Aero and Astro | | | | | | |
| 1400 hrs<br>AIAA-2016-0451<br>**Properties of Multi-Spark Plasma Discharge Developed for Flow Control**<br>V. Boretskij, A. Veklich, S. Fesenko, A. Lebid, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine | 1430 hrs<br>AIAA-2016-0452<br>**Experimental Investigation of Dynamic Stall in a Wide Range of Mach Numbers by Plasma Actuators with Combined Energy/ Momentum Action**<br>A. Starikovskiy, R. Miles, Princeton University, Princeton, NJ | 1500 hrs<br>AIAA-2016-0453<br>**Ignition, Sustained Flame, and Extinction of a Dielectric-Barrier-Discharge Altered Hydrogen Jet in a Cross-Flow**<br>R. Fontaine, J. Retter, J. Freund, N. Glumac, G. Elliott, University of Illinois, Urbana-Champaign, Urbana, IL | 1530 hrs<br>AIAA-2016-0454<br>**Plasma Assisted Turbulent Flow Separation control over a Backward Facing Step**<br>A. das Gupta, P. Zhao, S. Roy, University of Florida, Gainesville, Gainesville, FL | 1600 hrs<br>AIAA-2016-0455<br>**Active Control of a Turbulent Mixing Layer using Pulsed Laser and Pulsed Plasma**<br>A. Singh, J. Little, University of Arizona, Tucson, Tucson, AZ | 1630 hrs<br>AIAA-2016-0456<br>**Exposed-Electrode Geometry Effects on DBD Plasma Actuation over Conical Forebody**<br>D. Zhang, X. Meng, H. Hu, J. Wang, Northwestern Polytechnical University, Xi'an, China; F. Liu, S. Luo, University of California, Irvine, Irvine, CA | |

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| **96-PDL-4** | **Laser Discharge and Applications** | | | | | **Cortez Hill A** |
| Chaired by: S. MACHERET, Purdue University | | | | | | |
| 1400 hrs<br>AIAA-2016-0457<br>**Launch capability of a conceptual laser-launch system of a spherical vehicle and a dunut-mode beam**<br>K. Mori, R. Maruyama, Nagoya University, Nagoya, Japan | 1430 hrs<br>AIAA-2016-0458<br>**Schlieren imaging investigation of successive laser-induced breakdowns in quiescence atmospheric air**<br>L. Wermer, S. Im, Worcester Polytechnic Institute, Worcester, MA; M. Bak, Sungkyunkwan University, Suwon, South Korea | 1500 hrs<br>AIAA-2016-0459<br>**Trajectory Control of Small Rotating Projectiles by Laser Sparks**<br>A. Starikovskiy, C. Limbach, R. Miles, Princeton University, Princeton, NJ | 1530 hrs<br>AIAA-2016-0460<br>**Laser Thermal Ignition Using a Dual-Pulse Approach**<br>C. Dumitrache, A. Yalin, Colorado State University, Fort Collins, CO | 1600 hrs<br>AIAA-2016-0461<br>**Femtosecond laser discharge and small scale turbulence**<br>A. Tropina, National University, Kharkov, Ukraine; M. Shneider, R. Miles, Princeton University, Princeton, NJ | | |

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| **97-SD-3** | **Reduced Order Modeling I** | | | | | **Balboa C** |
| Chaired by: N. FALKIEWICZ, MIT Lincoln Laboratory and B. GLAZ, U. S. Army Research Laboratory (APG) | | | | | | |
| 1400 hrs<br>AIAA-2016-0462<br>**Reduced Order Modeling of Highly Unsteady Flows Using Adaptive Sparse Bases**<br>R. Deshmukh, Z. Liang, J. McNamara, Ohio State University, Columbus, OH | 1430 hrs<br>AIAA-2016-0463<br>**Model Reduction of Unsteady Flows using Sparse Coding: Efficient Basis Extraction from Large Datasets**<br>Z. Liang, R. Deshmukh, J. McNamara, Ohio State University, Columbus, OH | 1500 hrs<br>AIAA-2016-0464<br>**Reduced Order Models for Generation of Large, High Speed Aerodynamic Databases with Jet Interactions**<br>A. Vanderwyst, A. Shelton, C. Martin, L. Neergaard, Z. Witeof, Leidos Corporation, Fort Walton Beach, FL | 1530 hrs<br>AIAA-2016-0465<br>**Efficiency Enhancement of Reduced Order Model using Variable Fidelity Modeling**<br>S. Lee, T. Kim, National University of Singapore, Singapore, Singapore; S. Jun, K. Yee, Seoul National University, Seoul, South Korea | 1600 hrs<br>AIAA-2016-0466<br>**Reduced-Order Modeling of Flow-Induced Vibrations in Bellows Joints of Rocket Propulsion Systems**<br>S. Higgins, R. Davis, University of Georgia, Athens, Athens, GA; A. Brown, NASA Marshall Space Flight Center, Huntsville, AL | | |

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| **98-SD-4** | **Dynamic Loads, Response, and Vibration I** | | | | | **Gaslamp A** |
| Chaired by: T. KINNEY, NASA-Kenndey Space Center and Z. SOTOUDEH, Rensselaer Polytechnic Institute | | | | | | |
| 1400 hrs<br>AIAA-2016-0467<br>**Aeroelastic Response of the ACTE Transition Section**<br>C. Herrera, N. Spivey, S. Lung, NASA Armstrong Flight Research Center, Edwards, CA; G. Ervin, FlexSys, Inc., Ann Arbor, MI; P. Flick, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1430 hrs<br>AIAA-2016-0468<br>**Dynamic Behavior of Initially-Stressed and Post-Buckled Laminated Composite Beams**<br>J. Kosmatka, University of California, San Diego, La Jolla, CA | 1500 hrs<br>AIAA-2016-0469<br>**Dynamic Response of Aeroelastically Tailored Composite Wing: Analysis and Experiment**<br>J. Sodja, N. Werter, M. Natella, Delft University of Technology, Delft, The Netherlands ; J. Dillinger, German Aerospace Center (DLR), Göttingen, Germany; R. De Breuker, Delft University of Technology, Delft, The Netherlands | 1530 hrs<br>AIAA-2016-0470<br>**The Influence of Wing Flexibility on the Stability of a Biomimetic Flapping Wing Micro Air Vehicle in Hover**<br>J. Bluman, M. Sridhar, C. Kang, University of Alabama, Huntsville, Huntsville, AL | 1600 hrs<br>AIAA-2016-0471<br>**Damped Free Vibration Response of An Adhesively Bonded Stiffened Plate with Plate-Strip Stiffeners**<br>N. Ahmad, R. Kapania, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1630 hrs<br>AIAA-2016-0472<br>**Impact of the Wing Sweep Angle and Rib Orientation on Wing Structural Response for Un-Tapered Wings**<br>G. Francois, J. Cooper, P. Weaver, University of Bristol, Bristol, United Kingdom | 1700 hrs<br>AIAA-2016-0473<br>**Energy Based Representations of Mechanical Shock for Failure Characterization**<br>V. Babuska, C. Sisemore, J. Booher, Sandia National Laboratories, Albuquerque, NM |

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| **99-SE-2** | **Systems Engineering II** | | | | | **La Jolla B** |
| Chaired by: D. DRESS, NASA Langley Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0474<br>**Resilience Analysis for Complex Supply Chain Systems Using Bayesian Networks**<br>N. Yodo, P. Wang, Wichita State University, Wichita, KS | 1430 hrs<br>AIAA-2016-0475<br>**Resilient Multi-UAV Operation: Key Concepts and Challenges**<br>E. Ordoukhanian, A. Madni, University of Southern California, Los Angeles, CA | 1500 hrs<br>AIAA-2016-0476<br>**Agent-Based Flexible Design Contracts for Resilient Spacecraft Swarms**<br>M. Sievers, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; A. Madni, University of Southern California, Los Angeles, CA | | | | |

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| **100-SEO-2** | **Innovative Ideas for Exploring and Operating Space Missions** | | | | | **Americas Cup A** |
| Chaired by: L. BRYANT, Jet Propulsion Laboratory and S. BURLEIGH, Jet Propulsion Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-0477<br>**ASTROSAT - Overview and Technical Architecture of India's First Space Observatory**<br>V. Sundararajan, Aerospace India, Research Triangle Park, NC | 1430 hrs<br>Oral Presentation<br>**Adaptive Control Strategy of Exploration Rover with Potential Function Method**<br>R. Hatori, Japan Society for Aeronautical and Space Sciences, Tokyo, Japan; K. Shibuya, K. Uchiyama, Nihon University, Funabashi, Japan | 1500 hrs<br>AIAA-2016-0478<br>**Transfer trajectory design about doubly synchronous binary asteroid system**<br>X. Wu, H. Shang , X. Qin, Beijing Institute of Technology, Beijing, China | 1530 hrs<br>AIAA-2016-0479<br>**A GNC Perspective of the Launch and Commissioning of NASA's New SMAP (Soil Moisture Active Passive) Spacecraft**<br>T. Brown, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | 1600 hrs<br>AIAA-2016-0480<br>**Study of Optimal Transfers from $L_2$ Halo-orbits to Lunar Surface**<br>Y. Ulybyshev, RSC Energia, Korolev, Russia | 1630 hrs<br>AIAA-2016-0481<br>**Electromagnetic Propulsion system for spacecrafts using geomagnetic fields and superconductors.**<br>A. Dadhich, University of Cincinnati, Cincinnati, OH | |

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| **101-SOF-3** | **Software Challenges in Aerospace Symposium** | | | | | **Regatta A** |
| Chaired by: J. MURPHY, NASA -Ames Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0482<br>**Applying Machine Learning for Run-time Bug Detection in Aviation Software**<br>H. Huang, S. Guyer, J. Rife, Tufts University, Medford, MA | 1430 hrs<br>AIAA-2016-0483<br>**Soft Computing in Aerospace**<br>F. Briggs, Self, Solomons, MD | 1500 hrs<br>AIAA-2016-0484<br>**Towards Generic Requirements and Models for Automated Mission Tasks with RPAS**<br>C. Torens, F. Adolf, German Aerospace Center (DLR), Braunschweig, Germany; G. Patil, G. Vernekar, Technical University of Chemnitz, Chemnitz, Germany | | | | |

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| **102-STR-3** | **Aircraft Structural Design II** | | | | | **La Jolla A** |
| Chaired by: H. HILTON, University of Illinois at Urbana-Champaign and M. SENSMEIER, Embry-Riddle Aeronautical University | | | | | | |
| 1400 hrs<br>AIAA-2016-0485<br>**Parameterization Framework for Aeroelastic Design Optimization of Bio-Inspired Wing Structural Layout**<br>A. Dubois, C. Farhat, Stanford University, Stanford, CA; A. Abukhwejah, King Abdulaziz City for Science and Technology, Riyadh, Saudi Arabia | 1430 hrs<br>AIAA-2016-0486<br>**Analysis of Designer / Tailored Linear Aero-Piezo-Viscoelastic Energy Harvesting**<br>H. Hilton, Y. Saito, University of Illinois, Urbana-Champaign, Urbana, IL | 1500 hrs<br>AIAA-2016-0487<br>**Design and structural analysis of unique structures under an internal vacuum**<br>B. Cranston, A. Palazotto, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1530 hrs<br>AIAA-2016-0488<br>**Effects of Shallow-Angle, Thin-Ply Laminates on the Structural Performace of Composite Wing**<br>N. Kimber, J. Tian, S. Thielk, P. Chang, S. Ko, W. Lay, University of Washington, Seattle, Seattle, WA; et al. | 1600 hrs<br>AIAA-2016-0489<br>**Optimization, Manufacturing and Testing of a Composite Wing with Maximized Tip Deflection**<br>Y. Meddaikar, J. Dillinger, German Aerospace Center (DLR), Göttingen, Germany; J. Sodja, Delft University of Technology, Delft, The Netherlands ; H. Mai, German Aerospace Center (DLR), Göttingen, Germany; R. De Breuker, Delft University of Technology, Delft, The Netherlands | 1630 hrs<br>AIAA-2016-0490<br>**Thermal Response of a Spatially Graded Metal-Ceramic Structural Panel to Non-Uniform Heating in Hypersonic Flow**<br>P. Deierling, O. Zhupanska, University of Iowa, Iowa City, Iowa City, IA; C. Pasiliao, Air Force Research Laboratory, Eglin AFB, FL | |

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| **103-TES-3** | **Fluids and Combustion in Power Systems** | | | | | **Old Town A** |
| Chaired by: G. JACOBS, San Diego State Univ and F. MASHAYEK, University of Illinois at Chicago | | | | | | |
| 1400 hrs<br>AIAA-2016-0492<br>**Comparative Study of Using Streamlined Bodies as a Passive Enhancer in Combustor Dilution System**<br>R. Amano, T. ElHammal, University of Wisconsin, Milwaukee, Glendale, WI | 1430 hrs<br>AIAA-2016-0493<br>**Multi-Location Fuel Injection Effects on NO*/OH* Chemiluminescence in a High Intensity Combustor**<br>A. Said, A. Gupta, University of Maryland, College Park, College Park, MD | 1500 hrs<br>AIAA-2016-0494<br>**Investigation of Heat Transfer and Fluid Mechanics across a Heated Rotating Circular Cylinder in Crossflow**<br>O. Fatta, G. Smaisim, N. Syred, A. Valera-Medina, A. Rageb, Cardiff University, Cardiff, United Kingdom | 1530 hrs<br>AIAA-2016-0495<br>**Numerical Investigation of PEM Fuel Cell Performance in an Aircraft Oxygen–Gas Oxidizer System**<br>K. Okai, T. Himeno, T. Watanabe, University of Tokyo, Tokyo, Japan; Y. Yachi, IHI Corporation, Tokyo, Japan; N. Shinozaki, IHI Aerospace CO., Ltd., Gunma, Japan | 1600 hrs<br>AIAA-2016-0496<br>**Thermal Field Investigation under Distributed Combustion Conditions**<br>A. Khalil Hasan, A. Gupta, University of Maryland, College Park, College Park, MD | 1630 hrs<br>AIAA-2016-0497<br>**Large Eddy Simulation of a Supersonic Underexpanded Jet with a High-order Hybrid Central/WENO-Z Scheme**<br>D. Quimby, G. Jacobs, San Diego State University, San Diego, CA | 1700 hrs<br>AIAA-2016-0498<br>**Investigation of Alumina Flow Breakup Process in Solid Rocket Propulsion Chamber**<br>Y. Yen, R. Amano, University of Wisconsin, Milwaukee, Glendale, WI |

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| **104-TP-3** | **Non-Equilibrium Flows, Non-Equilibrium Radiation and Rarefied Flows I** | | | | | **Harbor G** |
| Chaired by: J. BURT, Universal Technology Corporation and R. GOSSE, WPAFB | | | | | | |
| 1400 hrs<br>AIAA-2016-0499<br>**Entropy Production Analysis of Burnett Equations Using Classical Thermodynamics with Gibbs Equations**<br>H. Liu, W. Chen, W. Zhao, Zhejiang University, Hangzhou, China; R. Agarwal, Washington University in St. Louis, St. Louis, MO | 1430 hrs<br>AIAA-2016-0500<br>**Ab initio based model for high temperature nitrogen rovibrational excitation and dissociation**<br>P. Valentini, T. Schwartzentruber, I. Nompelis, G. Candler, University of Minnesota, Minneapolis, Minneapolis, MN | 1500 hrs<br>AIAA-2016-0501<br>**Study of Shock-Shock Interactions Using an Unstructured AMR Octree DSMC Code**<br>S. Sawant, O. Tumuklu, University of Illinois, Urbana-Champaign, Urbana, IL; B. Korkut, Pennsylvania State University, University Park, PA; D. Levin, University of Illinois, Urbana-Champaign, Urbana, IL | 1530 hrs<br>AIAA-2016-0502<br>**Molecular Dynamics Studies of Nitrogen collision on Graphene and Quartz Surfaces**<br>N. Mehta, D. Levin, University of Illinois, Urbana-Champaign, Urbana, IL | 1600 hrs<br>AIAA-2016-0503<br>**Comparison of quantum mechanical and empirical potential energy surfaces and computed rate coefficients for $N_2$ dissociation**<br>R. Jaffe, D. Schwenke, NASA Ames Research Center, Moffett Field, CA; S. Venturi, M. Panesi, University of Illinois, Urbana-Champaign, Urbana, IL; M. Grover, T. Schwartzentruber, University of Minnesota, Minneapolis, Minneapolis, MN | 1630 hrs<br>AIAA-2016-0504<br>**Effect of reagent energy on nonequilibrium O2+O dissociation**<br>M. Kulakhmetov, M. Gallis, Purdue University, West Lafayette, IN; A. Alexeenko, Sandia National Laboratories, Albuquerque, NM | 1700 hrs<br>AIAA-2016-0505<br>**State-to-State and reduced-order models for dissociation and energy transfer in aerothermal environments**<br>A. Munafò, R. Macdonald, M. Panesi, University of Illinois, Urbana-Champaign, Urbana, IL |

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| **105-TP-4** | **Heat Transfer: Conduction, Convection, Phase Change, Radiation, and Conjugate Heat Transfer** | | | | | **Harbor H** |
| Chaired by: K. POPE, Memorial University of Newfoundland and E. SHORT, Raytheon Company | | | | | | |
| 1400 hrs<br>AIAA-2016-0506<br>**Inviscid-flow approximation of radiative ablation of asteroidal meteoroids by line-by-line method.**<br>C. Park, Korea Advanced Institute of Science and Technology, Daejeon, South Korea | 1430 hrs<br>AIAA-2016-0507<br>**Limits for Thermionic Emission from Leading Edges of Hypersonic Vehicles**<br>K. Hanquist, I. Boyd, University of Michigan, Ann Arbor, Ann Arbor, MI | 1500 hrs<br>AIAA-2016-0508<br>**Analysis of Internal Thermocouple Data in Carbon/Carbon Using Inverse Heat Conduction Methods**<br>M. Pizzo, Old Dominion University, Norfolk, VA; D. Glass, K. Bey, NASA Langley Research Center, Hampton, VA | 1530 hrs<br>AIAA-2016-0509<br>**Heat Transport in Aqueous Suspensions of Alumina Nanoparticles**<br>M. Muraleedharan, D. Sundaram, V. Yang, Georgia Institute of Technology, Atlanta, GA | 1600 hrs<br>AIAA-2016-0510<br>**An Experimental Investigation on Unsteady Heat Transfer and Transient Icing Process upon Impingement of Water Droplets**<br>H. Li, R. Waldman, H. Hu, Iowa State University, Ames, IA | 1630 hrs<br>AIAA-2016-0511<br>**Simulation of Steady Two-Dimensional Heat Transfer in Rectangular Micro-Cavities at Elevated Pressures**<br>M. Martin, P. Kumar, Louisiana State University, Baton Rouge, LA | |

| Monday, 4 January 2016 | | | | | | |
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| **106-UMS-2** | **Unmanned Systems - Flight Dynamics and Control** | | | | | **Regatta C** |
| Chaired by: J. JACOB, Oklahoma State University and R. PRAZENICA, Embry-Riddle Aeronautical University, Daytona Beach | | | | | | |
| 1400 hrs<br>AIAA-2016-0512<br>**Non-linear Model Predictive Control for Longitudinal and Lateral Guidance of a Small Fixed-Wing UAV in Precision Deep Stall Landing**<br>S. Mathisen, K. Gryte, T. Johansen, T. Fossen, Norwegian University of Science and Technology, Trondheim, Norway | 1430 hrs<br>AIAA-2016-0513<br>**Lateral-Directional Stability of the Near-space Solar-powered Aircraft**<br>Y. Chuan, L. Feng, L. Guangjia, Y. Wang, China Academy of Aerospace Aerodynamics, Beijing, China | 1500 hrs<br>AIAA-2016-0514<br>**Dynamic Model of 25% Yak-54 Unmanned Aerial System**<br>R. LaRue, S. Thomas, I. Costa, W. Liu, C. Yeo, University of Kansas, Lawrence, Lawrence, KS | 1530 hrs<br>AIAA-2016-0515<br>**Autonomous Formation Flight of Indoor UAVs Based on Model Predictive Control**<br>S. Mao, W. Tan, K. Low, Nanyang Technological University, Singapore, Singapore | 1600 hrs<br>AIAA-2016-0516<br>**Longitudinal Control Considering Trim of Outdoor Blimp Robots for Disaster Surveillance**<br>H. Saiki, National Research Institute of Fire and Disaster, Tokyo, Japan | | |

| Monday, 4 January 2016 | | | | | | |
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| **107-WE-1** | **Wind Energy: Wind Turbine Aerodynamics Improvements and Analysis** | | | | | **Harbor I** |
| Chaired by: J. NAUGHTON, University of Wyoming and M. CHURCHFIELD, National Renewable Energy Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-0517<br>**Study of Drag Reduction Devices on a Flatback Airfoil**<br>M. Manolesos, G. Papadakis, S. Voutsinas, National Technical University of Athens, Athens, Greece | 1430 hrs<br>AIAA-2016-0518<br>**Application of Vortex Generators to Wind Turbine Blades**<br>Q. Tian, Frontier Wind, Rocklin, CA; D. Corson, Altair Engineering, Inc., Malta, NY; J. Baker, Frontier Wind, Rocklin, CA | 1500 hrs<br>AIAA-2016-0519<br>**Effects of Mie Vanes and Tip Injection on the Performance and Wake Characteristics of a HAWT**<br>A. Abdulrahim, E. Anik, O. Uzol, Middle East Technical University, Ankara, Turkey | 1530 hrs<br>AIAA-2016-0520<br>**Prediction and Analysis of the Nonsteady Transitional Boundary Layer Dynamics for flow over an Oscillating Wind Turbine Airfoil using the $\gamma$-$Re_\theta$ Transition Model**<br>T. Nandi, J. Brasseur, G. Vijayakumar, Pennsylvania State University, University Park, PA | 1600 hrs<br>AIAA-2016-0521<br>**Interaction of Atmospheric Turbulence with Blade Boundary Layer Dynamics on a 5MW Wind Turbine using Blade-boundary-layer-resolved CFD with hybrid URANS-LES**<br>G. Vijayakumar, J. Brasseur, A. Lavely, B. Jayaraman, B. Craven, Pennsylvania State University, University Park, PA | 1630 hrs<br>AIAA-2016-0522<br>**Experimental study of near and far wake generated by a Gurney mini flap in turbulent flow**<br>J. Delnero, J. Marañón Di Leo, M. Garcia Sainz, National University of La Plata, La Plata, Argentina | |

| Monday, 4 January 2016 | | |
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| 108-NW-4<br>1530 - 1600 hrs | Monday Afternoon Networking Coffee Break | Session Room Foyers |

| Monday, 4 January 2016 | | |
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| 109-PANEL-3<br>1530 - 1730 hrs | SCS: Infusing New Structures Technology Into Space Systems | Harbor A |
| Moderators: W. Keith Belvin, NASA Langley Research Center, Greg Agnes, Jet Propulsion Laboratory, California Institute of Technology | | |

| Monday, 4 January 2016 | | |
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| 110-LEC-3<br>1730 - 1830 hrs | The Future of AIAA: Why Governance Matters to You | Seaport A-E |
| James F. Albaugh<br>President<br>AIAA | | |

| Monday, 4 January 2016 | | |
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| 111-NW-5<br>1830 - 1930 hrs | Rising Leaders Reception | Seaport H |

## Tuesday

| Tuesday, 5 January 2016 | | |
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| 112-NW-6<br>0700 - 0730 hrs | Tuesday Early Morning Networking Coffee Break | Session Room Foyers |

| Tuesday, 5 January 2016 | | |
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| 113-SB-2<br>0730 - 0800 hrs | Tuesday Morning Speakers' Briefing | Session Rooms |

| Tuesday, 5 January 2016 | | |
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| 114-PLNRY-2<br>0800 - 0900 hrs | Tuesday Morning Plenary Panel<br><br>Aerospace Generations – Lessons Learned from a Half Century of Innovation in Aerospace Technology | Seaport A-E |

Moderator: Mason Peck, Associate Professor, Sibley School of Mechanical and Aerospace Engineering, Cornell University

Panelists:

**Hans Mark**
Professor Emeritus
The University of Texas, Austin

**Zac Manchester**
Postdoctoral Fellow, Agile Robotics Laboratory
Harvard University

**Mary Popp**
Propulsion Engineer
Lockheed Martinn Corporation

**William Anders**
U.S. Air Force (ret.)

| Tuesday, 5 January 2016 | | | | | | |
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| **115-AA-3** | **Aeroacoustics - Jet Noise II** | | | | | **Nautical** |
| Chaired by: C. BROWN, NASA Glenn and D. NARK, NASA Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-0523<br>**Quiet Nozzle Concepts for Three-Stream Jets**<br>D. Papamoschou, V. Phong, J. Xiong, F. Liu, University of California, Irvine, Irvine, CA | 0930 hrs<br>AIAA-2016-0524<br>**Correlation of events between near- and far-field of a 3-stream supersonic nozzle**<br>J. Lewalle, M. Glauser, Syracuse University, Syracuse, NY; S. Gogineni, C. Ruscher, Spectral Energies, LLC, Dayton, OH; B. Kiel, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1000 hrs<br>AIAA-2016-0525<br>**Acoustic Signature of a Supersonic Jet Emanating from a Rectangular C-D Nozzle**<br>H. Hafsteinsson, N. Andersson, Chalmers University of Technology, Göteborg, Sweden; B. Malla, E. Gutmark, University of Cincinnati, Cincinnati, OH | 1030 hrs<br>AIAA-2016-0526<br>**A Comparison of the Aeroacoustic Characteristics of Free and Impinging Jets with Noise Reduction Techniques**<br>S. Hromisin, L. Myers, D. McLaughlin, P. Morris, Pennsylvania State University, University Park, PA | 1100 hrs<br>AIAA-2016-0527<br>**Flow and Acoustic Features of a Mach 0.9 Jet Using High Frequency Excitation**<br>P. Upadhyay, G. Valentich, F. Alvi, Florida State University, Tallahassee, FL | 1130 hrs<br>AIAA-2016-0528<br>**Hybrid Approach to Nonlinear Propagation of Jet Noise in Complex Environments**<br>V. Sassanis, A. Sescu, E. Collins, Mississippi State University, Starkville, MS; R. Harris, CFD Research Corporation, Huntsville, AL; E. Luke, Mississippi State University, Starkville, MS | |

| Tuesday, 5 January 2016 | | | | | | |
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| **116-ABPSI-3** | **Inlets** | | | | | **Golden Hill B** |
| Chaired by: E. LOTH, University of Virginia | | | | | | |
| 0900 hrs<br>AIAA-2016-0529<br>**Numerical Investigation on Two Streamline-Traced Busemann Inlet-Isolators**<br>F. Xing, Y. Huang, X. Fang, Xiamen University, Xiamen, China; Y. Yao, University of the West of England, Bristol, United Kingdom | 0930 hrs<br>AIAA-2016-0530<br>**SUPIN: A Computational Tool for Supersonic Inlet Design**<br>J. Slater, NASA Glenn Research Center, Cleveland, OH | 1000 hrs<br>AIAA-2016-0531<br>**Interpolation Methods for Inlet Distortion Determination**<br>S. Walter, R. Starkey, University of Colorado, Boulder, Boulder, CO | 1030 hrs<br>AIAA-2016-0532<br>**Mass Flow Ratio Influence on Shock and Pressure Spectra for a Low-Boom Supersonic Inlet**<br>E. Loth, S. Candon, University of Virginia, Charlottesville, Charlottesville, VA; M. Rybalko, University of Illinois, Urbana-Champaign, Urbana, IL | 1100 hrs<br>AIAA-2016-0533<br>**Measurements of Fan Response to Inlet Total Pressure and Swirl Distortions Produced by Boundary Layer Ingesting Aircraft Configurations**<br>D. Frohnapfel, A. Ferrar, J. Bailey, W. O'Brien, K. Lowe, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1130 hrs<br>AIAA-2016-0534<br>**An overview of recent results using the StreamVane method for generating tailored swirl distortion in jet engine research**<br>T. Guimaraes Bucalo, K. Lowe, W. O'Brien, Virginia Polytechnic Institute and State University, Blacksburg, VA | |

| Tuesday, 5 January 2016 | | | | | | |
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| **117-ACD-1** | **Aircraft Design Issues I** | | | | | **Cortez Hill A** |
| Chaired by: D. CARTER, Air Force Research Laboratory and D. BENCHERGUI, Bombardier Inc | | | | | | |
| 0900 hrs<br>AIAA-2016-0535<br>**Legacy Aircraft Drag Reduction**<br>D. Carter, Air Force Research Laboratory, Wright-Patterson AFB, OH | 0930 hrs<br>AIAA-2016-0536<br>**Planning Technology Development Experimentation through Quantitative Uncertainty Analysis**<br>K. Gatian, D. Mavris, Georgia Institute of Technology, Atlanta, GA | 1000 hrs<br>AIAA-2016-0537<br>**Aircraft Design as a Tool in Achieving Educational Objectives for Engineering Concepts in a Core Curriculum**<br>R. Cummings, S. Reed, A. Rolling, S. Brandt, U.S. Air Force Academy, Colorado Springs, CO | | | | |

| Tuesday, 5 January 2016 | | | | | | |
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| **118-AFM-5** | **Launch Vehicle, Missile, and Projectile Flight Mechanics I** | | | | | **Cortez Hill B** |
| Chaired by: B. BURCHETT, Rose-Hulman Institute of Technology and B. JOLLY, US Air Force | | | | | | |
| 0900 hrs<br>AIAA-2016-0538<br>**Projectile Parameter Estimation Using Meta-Optimization**<br>M. Gross, M. Costello, Georgia Institute of Technology, Atlanta, GA | 0930 hrs<br>AIAA-2016-0539<br>**Euler-Lagrange Optimal Control of Indirect Fire Symmetric Projectiles**<br>A. Nash, B. Burchett, Rose-Hulman Institute of Technology, Terre Haute, IN | 1000 hrs<br>AIAA-2016-0540<br>**Performance Optimization of Guided Projectiles Using Design of Experiments**<br>L. Fowler, J. Rogers, Georgia Institute of Technology, Atlanta, GA | 1030 hrs<br>AIAA-2016-0541<br>**Coning Motion Instability of a Spinning Missile Induced by Aeroelasticity**<br>S. Zhongjiao, L. Zhao, J. Peng, Beijing Institute of Technology, Beijing, China | 1100 hrs<br>AIAA-2016-0542<br>**Empirical Mode Decomposition Filtering of Wind Profiles**<br>B. Sako, The Aerospace Corporation, El Segundo, CA | | |

| Tuesday, 5 January 2016 | | | | | | |
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| 119-APA-11 | Special Session: Space Launch System (SLS) Induced Environments I | | | | | Coronado D |
| Chaired by: J. BLEVINS, NASA Marshall Space Flight Center and J. PINIER, NASA Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-0543<br>**Overview of the Space Launch System Ascent Aeroacoustic Environment Test Program**<br>A. Herron, W. Crosby, D. Reed, NASA Marshall Space Flight Center, Huntsville, AL | 0930 hrs<br>AIAA-2016-0544<br>**Sensitivity of Space Launch System Buffet Forcing Functions to Buffet Mitigation Options**<br>D. Piatak, M. Sekula, R. Rausch, NASA Langley Research Center, Hampton, VA | 1000 hrs<br>AIAA-2016-0545<br>**Effect of Surface Pressure Integration Methodology on Launch Vehicle Buffet Forcing Functions**<br>M. Sekula, D. Piatak, R. Rausch, NASA Langley Research Center, Hampton, VA | 1030 hrs<br>AIAA-2016-0546<br>**Space Launch System Base Heating Test: Experimental Operations and Results**<br>A. Dufrene, CUBRC, Buffalo, NY; M. Mehta, NASA Marshall Space Flight Center, Huntsville, AL; M. MacLean, CUBRC, Buffalo, NY; M. Seaford, NASA Marshall Space Flight Center, Huntsville, AL; M. Holden, CUBRC, Buffalo, NY | 1100 hrs<br>AIAA-2016-0547<br>**Space Launch System Base Heating Test: Environments and Base Flow Physics**<br>M. Mehta, NASA Marshall Space Flight Center, Huntsville, AL; A. Dufrene, CUBRC, Buffalo, NY; M. Seaford, K. Knox, NASA Marshall Space Flight Center, Huntsville, AL | 1130 hrs<br>AIAA-2016-0548<br>**Space Launch System Base Heating Test: Tunable Diode Laser Absorption Spectroscopy**<br>R. Parker, Z. Carr, A. Dufrene, CUBRC, Buffalo, NY; M. Mehta, NASA Marshall Space Flight Center, Huntsville, AL | |

| Tuesday, 5 January 2016 | | | | | | |
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| 120-APA-12 | Applied CFD & Numerical Correlations with Experimental Data I | | | | | Americas Cup B |
| Chaired by: J. SLOTNICK, Boeing Engineering Operations & Technology and C. KIRIS, NASA Ames Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-0549<br>**Simulation of ONERA M6 Wing Flows for Assessment of Turbulence Modeling Capabilities**<br>R. Silva, J. Azevedo, E. Basso, Aeronautics and Space Institute (IAE), São José dos Campos, Brazil | 0930 hrs<br>AIAA-2016-0550<br>**Inflow Turbulence Effects on Transition Prediction Using a Correlation-Based Transition Model**<br>G. Halila, E. Bigarella, A. Antunes, Embraer, São José dos Campos, Brazil; J. Azevedo, Aeronautics and Space Institute (IAE), São José dos Campos, Brazil | 1000 hrs<br>AIAA-2016-0551<br>**A Comparison of Transition Prediction Methodologies Applied to High Reynolds Number External Flows**<br>C. Langel, R. Chow, C. Van Dam, University of California, Davis, Davis, CA | 1030 hrs<br>AIAA-2016-0552<br>**Dynamic Stability Analysis of a Reentry Lifting Capsule with Detached Eddy Simulation**<br>A. Hashimoto, K. Murakami, T. Aoyama, R. Tagai, S. Koga, S. Nagai, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; et al. | 1100 hrs<br>AIAA-2016-0553<br>**Comparison of Drag Prediction Using RANS models and DDES for the DLR-F6 Configuration Using High Order Schemes**<br>J. Gan, University of Miami, Miami, FL; Y. Shen, Chinese Academy of Sciences, Beijing, China; G. Zha, University of Miami, Miami, FL | 1130 hrs<br>AIAA-2016-0554<br>**Application of Hybrid Turbulence Method to Transonic Flowfield of a Payload Fairing**<br>S. Tsutsumi, R. Takaki, S. Koike, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; S. Teramoto, University of Tokyo, Hongo, Japan | 1200 hrs<br>AIAA-2016-0555<br>**High Fidelity, High Order, Large Eddy Simulations of a Real Geometry Aircraft Nose Landing Gear on Hybrid Unstructured Meshes & Small-scale Many-core Computing System**<br>Y. Lu, A. Demargne, Cambridge Flow Solutions Ltd, Cambridge, United Kingdom; K. Liu, BoXeR Solutions KK, Kobe, Japan; W. Dawes, Cambridge University, Cambridge, United Kingdom |

| Tuesday, 5 January 2016 | | | | | | |
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| 121-APA-13 | Aerodynamic Design: Analysis, Methodologies, and Optimization Techniques II | | | | | Americas Cup C |
| Chaired by: K. DENISSEN, Sandia National Labs and A. SCLAFANI, Boeing Commercial Airplanes | | | | | | |
| 0900 hrs<br>AIAA-2016-0556<br>**Part I: Uncertainty Analysis of Various Design Parameters on Winglet Performance**<br>J. Masud, Z. Toor, Air University, Islamabad, Pakistan; Z. Abbas, U. Ahsun, King Saud University, Riyadh, Saudi Arabia | 0930 hrs<br>AIAA-2016-0557<br>**Multifidelity Optimization for High-Lift Airfoils**<br>J. Demange, A. Savill, T. Kipouros, Cranfield University, Cranfield, United Kingdom | 1000 hrs<br>AIAA-2016-0558<br>**A Geometric Comparison of Aerofoil Shape Parameterisation Methods**<br>D. Masters, University of Bristol, Bristol, United Kingdom; N. Taylor, MBDA, Bristol, United Kingdom; T. Rendall, C. Allen, D. Poole, University of Bristol, Bristol, United Kingdom | 1030 hrs<br>AIAA-2016-0559<br>**Progressive Subdivision Curves for Aerodynamic Shape Optimisation**<br>D. Masters, University of Bristol, Bristol, United Kingdom; N. Taylor, MBDA, Bristol, United Kingdom; T. Rendall, C. Allen, University of Bristol, Bristol, United Kingdom | 1100 hrs<br>AIAA-2016-0560<br>**Using surface sensitivity from mesh adjoint solution for transonic wing drag reduction**<br>B. Hinchliffe, N. Qin, University of Sheffield, Sheffield, United Kingdom | 1130 hrs<br>AIAA-2016-0561<br>**Prediction and Experimental Evaluation of Planar Wing Spanloads for Minimum Drag**<br>G. Wroblewski, P. Ansell, University of Illinois, Urbana-Champaign, Urbana, IL | |

| Tuesday, 5 January 2016 | | | | | | |
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| **122-APA-14** | **Special Session: CREATE-AV HPC Multiphysics Applications of Full-up Air Vehicles I** | | | | | **Coronado E** |
| Chaired by: N. HARIHARAN, CREATE-AV and R. MEAKIN | | | | | | |
| 0900 hrs<br>AIAA-2016-0562<br>**The CREATE Program: Design and Analysis Tools for DoD Weapon Systems**<br>D. Post, C. Atwood, K. Newmeyer, R. Meakin, J. D'Angelo, S. Dey, U.S. Army Corps of Engineers, Lorton, VA | 0930 hrs<br>AIAA-2016-0563<br>**Recent Advancements in the Helios Rotorcraft Simulation Code**<br>A. Wissink, Army Aviation and Missile Research Development and Engineering Center, Moffett Field, CA; J. Sitaraman, Parallel Geometric Algorithms, LLC, Sunnyvale, CA; B. Jayaraman, B. Roget, V. Lakshminarayan, Science and Technology Corporation, Moffett Field, CA; M. Potsdam, Army Aviation and Missile Research Development and Engineering Center, Moffett Field, CA; et al. | 1000 hrs<br>AIAA-2016-0564<br>**An Assessment of CREATE™-AV Helios for Apache Hover and Forward Flight Simulations**<br>R. Narducci, The Boeing Company, Philadelphia, PA; H. Tadghighi, The Boeing Company, Mesa, AZ | 1030 hrs<br>AIAA-2016-0565<br>**HPCMP CREATE™-AV Kestrel Architecture, Capabilities, and Long Term Plan for Fixed-Wing Aircraft Simulations**<br>S. Morton, R. Meakin, CREATE AV Team, Eglin AFB, FL | 1100 hrs<br>AIAA-2016-0566<br>**Mixing Plane Multi-Stage Turbomachinery Simulation Capability for Kestrel/Firebolt**<br>R. Nichols, D. McDaniel, University of Alabama, Birmingham, Birmingham, AL; K. Jason, Aerospace Testing Alliance, Arnold AFB, TN | 1130 hrs<br>AIAA-2016-0567<br>**Introduction to COFFE: The Next-Generation HPCMP CREATE™-AV CFD Solver**<br>R. Glasby, J. Erwin, University of Tennessee, Oak Ridge, Oak Ridge, TN | 1200 hrs<br>AIAA-2016-0568<br>**Application of CREATE™-AV Helios to Predict CH-47 Dynamic Blade Loads**<br>D. O'Brien, Army Research, Development and Engineering Command, Redstone Arsenal, AL |

| Tuesday, 5 January 2016 | | | | | | |
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| **123-APA-15** | **Flow Control Applications & Demonstrations I** | | | | | **Americas Cup D** |
| Chaired by: B. CYBYK, The Johns Hopkins University Applied Physics Laboratory and K. VANDEN, USAF | | | | | | |
| 0900 hrs<br>AIAA-2016-0569<br>**Simulation of Sweep-Jet Flow Control, Single Jet and Full Vertical Tail**<br>R. Childs, P. Stremel, Science and Technology Corporation, Hampton, VA; L. Kushner, University of California, Santa Cruz, Moffett Field, CA; J. Heineck, B. Storms, NASA Ames Research Center, Moffett Field, CA | 0930 hrs<br>AIAA-2016-0570<br>**Trade Study of 3D Co-Flow Jet Wing for Cruise and Takeoff/Landing Performance**<br>A. Lefebvre, G. Zha, University of Miami, Coral Gables, FL | 1000 hrs<br>AIAA-2016-0571<br>**LES Analysis on Shock-Vortex Ring Interaction**<br>Y. Yang, J. Tang, C. Liu, University of Texas, Arlington, Arlington, TX | 1030 hrs<br>AIAA-2016-0572<br>**LES-based characterization of a suction and oscillatory blowing fluidic actuator**<br>J. Kim, P. Moin, Stanford University, Stanford, CA; A. Seifert, Tel Aviv University, Tel Aviv, Israel | 1100 hrs<br>AIAA-2016-0573<br>**Flow around a Finite Circular Cylinder Coated with Porous Media**<br>H. Yuan, C. Xia, Y. Chen, Z. Yang, Tongji University, Shanghai, China | | |

| Tuesday, 5 January 2016 | | | | | | |
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| **124-CMS-1/CPS-1** | **Communication, Computing and Information Processing** | | | | | **Regatta B** |
| Chaired by: E. BUTTE, Lockheed Martin Space Systems and C. LI, Air Force Office of Scientific Research | | | | | | |
| 0900 hrs<br>AIAA-2016-0574<br>**Battlefield Airborne Communications Node (BACN)**<br>K. Burns, K. Smith, Northrop Grumman Corporation, San Diego, CA | 0930 hrs<br>AIAA-2016-0575<br>**Smart Node Pod (SNP) - Big Capabilities in a Small Package**<br>S. Vaught, M. Rafter, K. Burns, C. Hill, Northrop Grumman Corporation, San Diego, CA; W. Roeting, George Mason Universtiy, Fairfax, VA | 1000 hrs<br>AIAA-2016-0576<br>**A low cost, secure radio communications system for UAVs**<br>A. Santangelo, sci_Zone, Inc., Holland, MI; P. Skentzos, Dornerworks, Grand Rapids, MI | 1030 hrs<br>AIAA-2016-0577<br>**ATLAS: Big Data Storage and Analytics Tool for ATM Researchers**<br>A. Tyagi, J. Nanda, Intelligent Automation, Inc., Rockville, MD | | | |

| Tuesday, 5 January 2016 | | | | | | |
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| 125-DE-1 | Design Processes and Tools | | | | | Old Town A |
| Chaired by: G. CREARY, NASA-Langley Research Center and C. DAVIES, Lockheed Martin Aeronautics | | | | | | |
| 0900 hrs<br>AIAA-2016-0578<br>**A High-Fidelity Approach to Conceptual Design**<br>J. Watson, R. Wlezien, Iowa State University, Ames, IA | 0930 hrs<br>AIAA-2016-0579<br>**Global/Local analysis of thermal effects on a threaded fastener**<br>B. Devarajan, D. Locatelli, R. Kapania, Virginia Polytechnic Institute and State University, Blacksburg, VA; R. Meritt, Ahmic Aerospace, LLC, Dayton, OH | 1000 hrs<br>AIAA-2016-0580<br>**Sizing Study for First-Order Feasibility Assessment of a Space Vehicle Applied to the Space Transportation System**<br>S. Hussein, B. Chudoba, University of Texas, Arlington, Arlington, TX | 1030 hrs<br>AIAA-2016-0581<br>**Electric Multirotor UAV Propulsion System Sizing for Performance Prediction and Design Optimization**<br>D. Bershadsky, S. Haviland, E. Johnson, Georgia Institute of Technology, Atlanta, GA | 1100 hrs<br>AIAA-2016-0582<br>**The Full-Scale Helicopter Flight Simulator Design and Fabrication at CCSU**<br>F. Wei, L. Amaya-Bower, A. Gates, D. Rose, T. Vasko, Central Connecticut State University, New Britain, CT | 1130 hrs<br>AIAA-2016-0583<br>**Ascendancy of Extinction-Reignition on Single-Stage Hybrid Sounding Rocket in View of Fuels**<br>K. Chiba, University of Electro-Communications, Tokyo, Japan; H. Yoda, S. Ito, M. Kanazaki, Tokyo Metropolitan University, Tokyo, Japan; S. Watanabe, Muroran Institute of Technology, Hokkaido, Japan; K. Kitagawa, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; et al. | |

| Tuesday, 5 January 2016 | | | | | | |
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| 126-FD-10 | CFD: Turbulence Modeling | | | | | Promenade A |
| Chaired by: H. NAGIB, IHI AEROSPACE Co., Ltd. | | | | | | |
| 0900 hrs<br>AIAA-2016-0584<br>**An Adaptive Variational Multiscale Discontinuous Galerkin Method For Large Eddy Simulation**<br>G. Kuru, M. de la Llave Plata, V. Couaillier, ONERA, Châtillon, France; R. Abgrall, University of Zurich, Zürich, Switzerland; F. Coquel, National Center for Scientific Research (CNRS), Palaiseau, Switzerland | 0930 hrs<br>AIAA-2016-0585<br>**Validation of a turbulence methodology using the SST k-ω model for adjoint calculation**<br>S. Evans, S. Lardeau, CD-adapco, London, United Kingdom | 1000 hrs<br>AIAA-2016-0586<br>**Development and Validation of a LES Turbulence Wall Model for Compressible Flows with Heat Transfer**<br>J. Komives, P. Subbareddy, G. Candler, University of Minnesota, Minneapolis, Minneapolis, MN | 1030 hrs<br>AIAA-2016-0587<br>**Turbulence Simulation Using Direct Gradient Adaptive k-ω Model**<br>Z. Li, H. Zhang, J. Hoagg, S. Bailey, A. Martin, University of Kentucky, Lexington, Lexington, KY | 1100 hrs<br>AIAA-2016-0588<br>**A new wall-law for adverse pressure gradient flows and modification of k-omega type RANS turbulence models**<br>T. Knopp, German Aerospace Center (DLR), Göttingen, Germany | | |

| Tuesday, 5 January 2016 | | | | | | |
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| 127-FD-15 | Aqueous Flow Control and Flow Control Experiments | | | | | Cove |
| Chaired by: L. CATTAFESTA, FAMU-FSU College of Engineering and R. LEBEAU, Saint Louis University | | | | | | |
| 0900 hrs<br>AIAA-2016-0589<br>**Thrust of a Zero-Net-Mass-Flux Actuator in Aqueous Crossflow**<br>B. Ayers, H. Johari, California State University, Northridge, CA | 0930 hrs<br>AIAA-2016-0590<br>**Numerical Investigation of Entrainment Mechanism of Jet Boat Tail Passive Flow Control for Base Drag Reduction**<br>Y. Yang, G. Zha, University of Miami, Coral Gables, FL | 1000 hrs<br>AIAA-2016-0591<br>**Fluidic Oscillators for Drag Reduction on a Bluff Body in Water**<br>H. Schmidt, Technical University of Berlin, Berlin, Germany; R. Woszidlo, University of Kansas, Lawrence, Lawrence, KS; C. Nayeri, C. Paschereit, Technical University of Berlin, Berlin, Germany | 1030 hrs<br>AIAA-2016-0592<br>**Pressure Characteristics over 20 deg Cone Forebody at Alpha 35 deg and Re (0.1-0.9)×10$^6$**<br>J. Zhao, X. Meng, J. Wang, Northwestern Polytechnical University, Xi'an, China; F. Liu, S. Luo, University of California, Irvine, Irvine, CA | 1100 hrs<br>AIAA-2016-0593<br>**An Investigation of Three-Dimensional Flow over a Undulating Inflatable Wing**<br>J. Beltz, G. Spencer, J. Krofta, R. LeBeau, Saint Louis University, St. Louis, MO | 1130 hrs<br>AIAA-2016-0594<br>**Bistable State of High Angle-of-Attack Flow over Conical Forebody.**<br>F. Liu, S. Luo, University of California, Irvine, Irvine, CA; X. Meng, J. Zhao, Northwestern Polytechnical University, Xi'an, China | |

| Tuesday, 5 January 2016 | | | | | | |
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| **128-FD-16** | **Boundary-Layer Transition** | | | | | **Promenade B** |
| Chaired by: H. REED, Texas A&M University and H. JOHNSON, University of Minnesota | | | | | | |
| 0900 hrs<br>AIAA-2016-0595<br>**Measurement of HIFiRE-5 Boundary-Layer Transition in a Mach-6 Quiet Tunnel with Infrared Thermography**<br>T. Juliano, L. Paquin, University of Notre Dame, Notre Dame, IN; M. Borg, Air Force Research Laboratory, Wright-Patterson AFB, OH | 0930 hrs<br>AIAA-2016-0596<br>**Global stability analysis on cone models under the conditions of the HIEST experiments**<br>Y. Matsuse, M. Saijo, T. Ishihara, Y. Ogino, N. Ohnishi, Tohoku University, Sendai, Japan; H. Tanno, Japan Aerospace Exploration Agency (JAXA), Kakuda, Japan | 1000 hrs<br>AIAA-2016-0597<br>**Prediction Methodology for 2nd Mode Dominated Boundary Layer Transition in Hypersonic Wind Tunnels**<br>E. Marineau, Arnold Engineering Development Center, Silver Spring, MD | 1030 hrs<br>AIAA-2016-0598<br>**Boundary Layer Stability Analysis for Stetson's Mach 6 Blunt Cone Experiments**<br>J. Jewell, R. Kimmel, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1100 hrs<br>AIAA-2016-0599<br>**Measurements of Instability in Supersonic Flow with Injection by Time-Resolved Flow Visualization**<br>B. Schmidt, J. Shepherd, California Institute of Technology, Pasadena, CA | | |

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| **129-FD-17** | **CFD: Cartesian and Mapped Grids** | | | | | **Pier** |
| Chaired by: S. KARMAN, Pointwise, Inc. and H. DONG, University of Virginia | | | | | | |
| 0900 hrs<br>AIAA-2016-0600<br>**A Cartesian Cut-Cell Approach for Modelling Air and Water Droplet Flow**<br>L. Wutschitz, N. Nikiforakis, University of Cambridge, Cambridge, United Kingdom | 0930 hrs<br>AIAA-2016-0601<br>**A Novel Simple Cut-Cell Method for Robust Flow Simulation on Cartesian Grids**<br>M. Harada, Y. Tamaki, Y. Takahashi, T. Imamura, University of Tokyo, Tokyo, Japan | 1000 hrs<br>AIAA-2016-0602<br>**Cartesian Cut-Cell and GFM Approaches to Free-Surface and Moving Boundary Interaction**<br>W. Bennett, L. Michael, N. Nikiforakis, University of Cambridge, Cambridge, United Kingdom | 1030 hrs<br>AIAA-2016-0603<br>**A Cartesian Immersed Boundary Method to Simulate Stably Stratified Turbulent Flows**<br>C. Umphrey, Boise State University, Boise, ID; R. DeLeon, University of Idaho, Boise, Boise, ID; I. Senocak, Boise State University, Boise, ID | 1100 hrs<br>AIAA-2016-0604<br>**A Fourth-Order Viscous Operator on Mapped Grids**<br>L. Owen, S. Guzik, X. Gao, Colorado State University, Fort Collins, CO | 1130 hrs<br>AIAA-2016-0605<br>**Anisotropic Patch-Based Adaptive Mesh Refinement for Finite-Volume Methods**<br>J. Christopher , X. Gao, S. Guzik, Colorado State University, Fort Collins, CO | 1200 hrs<br>AIAA-2016-0606<br>**A hierarchical Cartesian method for conjugate heat transfer involving moving bodies**<br>G. Brito Gadeschi, M. Meinke, W. Schroeder, RWTH Aachen University, Aachen, Germany |

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| **130-FD-18** | **RANS/LES and Its Applications** | | | | | **Harbor E** |
| Chaired by: X. GAO, Colorado State Univ and B. SMITH, Lockheed Martin Aeronautics | | | | | | |
| 0900 hrs<br>AIAA-2016-0607<br>**Simulation Using Flamelet Radiation Modeling**<br>J. Doom, South Dakota State University, Brookings, SD | 0930 hrs<br>AIAA-2016-0608<br>**A Comparison Study of Turbulence Models in RANS Simulations of Rotor 67**<br>N. Spotts, X. Gao, Colorado State University, Fort Collins, CO | 1000 hrs<br>AIAA-2016-0609<br>**LES/RANS Modeling of Turbulent Mixing in a Jet in Crossflow at Low Momentum Ratios**<br>J. Prause, Y. Emmi, B. Noll, M. Aigner, German Aerospace Center (DLR), Stuttgart, Germany | 1030 hrs<br>AIAA-2016-0610<br>**Impact of Periodic Boundary Conditions on the Flow Field in an Axial Fan**<br>A. Pogorelov, M. Meinke, W. Schroeder, RWTH Aachen University, Aachen, Germany | 1100 hrs<br>AIAA-2016-0611<br>**Turbulence Modeling for Realistic Computation of Internal Flow in Liquid Ejector Pumps**<br>J. Masud, M. Imran, Air University, Islamabad, Pakistan | 1130 hrs<br>AIAA-2016-0612<br>**A New DES Model Based on Wray-Agarwal Turbulence Model for Simulation of Wall-Bounded Flows**<br>H. Xu, T. Wray, R. Agarwal, Washington University in St. Louis, St. Louis, MO | |

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| **131-FD-19** | **Shock Boundary Layer Interaction III** | | | | | **Harbor F** |
| Chaired by: J. SIVASUBRAMANIAN, The University of Arizona and D. GAITONDE, The Ohio State University | | | | | | |
| 0900 hrs<br>AIAA-2016-0613<br>**Numerical Investigation of Shockwave Boundary Layer Interactions in Supersonic Flows**<br>J. Sivasubramanian, H. Fasel, University of Arizona, Tucson, Tucson, AZ | 0930 hrs<br>AIAA-2016-0614<br>**Numerical Investigation of a Normal Shock Wave Boundary Layer Interaction in a 4.3 Aspect Ratio Test Section**<br>M. Pizzella, S. Warning, M. Jennerjohn, M. McQuilling, Saint Louis University, St. Louis, MO; A. Purkey, R. Scharnhorst, The Boeing Company, St. Louis, MO; et al. | 1000 hrs<br>AIAA-2016-0615<br>**Conditional analysis of unsteadiness in shock boundary layer interactions**<br>M. Waindim, L. Agostini, Ohio State University, Columbus, OH; L. Larchevêque, National Center for Scientific Research (CNRS), Marseille, France; D. Gaitonde, Ohio State University, Columbus, OH | 1030 hrs<br>AIAA-2016-0616<br>**Ramp Separation Response to Laser-Induced Breakdown Disturbed Boundary Layer at Mach 4.5**<br>S. Im, L. Wermer, Worcester Polytechnic Institute, Worcester, MA; D. Baccarella, Q. Liu, B. McGann, University of Notre Dame, Notre Dame, IN; H. Do, Seoul National University, Seoul, South Korea | 1100 hrs<br>AIAA-2016-0617<br>**Simulation of Supersonic Turbulent Non-Reactive Flow in Ramp-Cavity Combustor Using a Discontinuous Spectral Element Method**<br>Z. Ghiasi, J. Komperda, D. Li, F. Mashayek, University of Illinois, Chicago, Chicago, IL | 1130 hrs<br>AIAA-2016-0618<br>**Direct Numerical Simulation of Shock Waves Passed by Multiple Particles by Using Immersed Boundary Method**<br>Y. Mizuno, S. Takahashi, Tokai University, Hiratsuka, Japan; T. Nonomura, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; T. Nagata, K. Fukuda, Tokai University, Hiratsuka, Japan | |

| Tuesday, 5 January 2016 | | | | | | |
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| **132-GNC-11** | **Adaptive Control** | | | | | **Hillcrest A** |
| Chaired by: M. BALAS, Embry-Riddle Aeronautical University and F. HOLZAPFEL | | | | | | |
| 0900 hrs<br>AIAA-2016-0619<br>**An L1 Adaptive Output Feedback Controller using Modified Piecewise Constant Adaptation Law**<br>M. Bichlmeier, Technical University of Munich, Munich, Germany | 0930 hrs<br>AIAA-2016-0620<br>**Direct Uncertainty Minimization Framework in the Presence of Unknown Control Effectiveness for Model Reference Adaptive Control**<br>B. Gruenwald, T. Yucelen, Missouri University of Science and Technology, Rolla, MO; J. Muse, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1000 hrs<br>AIAA-2016-0621<br>**Adaptive Model Tracking Control for Weakly Minimum Phase Linear Infinite-Dimensional Systems in Hilbert Space Using a Zero Filter**<br>M. Balas, Embry-Riddle Aeronautical University, Daytona Beach, FL; S. Frost, NASA Ames Research Center, Moffett Field, CA | 1030 hrs<br>AIAA-2016-0622<br>**Nonlinear Adaptive Robust Control with Linear Matrix Inequalities Applied to a Quadrotor**<br>D. Kun, I. Hwang, Purdue University, West Lafayette, IN | 1100 hrs<br>AIAA-2016-0623<br>**An LMI-Based Hedging Approach to Adaptive Control with Actuator Dynamics in the Presence of Unknown Control Effectiveness**<br>B. Gruenwald, D. Wagner, T. Yucelen, Missouri University of Science and Technology, Rolla, MO; J. Muse, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1130 hrs<br>AIAA-2016-0624<br>**Adaptive flow control of rotating wind turbine blades based on the Beddoes-Leishman model using trailing-edge flaps**<br>M. Balas, Embry-Riddle Aeronautical University, Daytona Beach, FL; N. Li, Yang Zhou University, Yang Zhou, China | |

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| **133-GNC-12** | **Spacecraft Parameter Estimation and Modeling** | | | | | **Hillcrest B** |
| Chaired by: U. SHANKAR, The Johns Hopkins University Applied Physics Laboratory and J. REED, United Launch Alliance, LLC | | | | | | |
| 0900 hrs<br>AIAA-2016-0625<br>**Attitude Estimation Employing Common Frame Error Representations**<br>M. Andrle, Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA; J. Crassidis, State University of New York, Amherst, NY | 0930 hrs<br>AIAA-2016-0626<br>**Spin-Axis Tilt Estimation for Spinning Spacecraft**<br>H. Soken, S. Sakai, K. Asamura, Y. Nakamura, T. Ken, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan | 1000 hrs<br>AIAA-2016-0627<br>**Angular Velocity Bounds via Light Curve Glint Duration**<br>J. Hinks, J. Crassidis, State University of New York, Amherst, NY | 1030 hrs<br>AIAA-2016-0628<br>**Realization of a Two-Synodic-Period Earth-Mars Cycler**<br>M. Naeije, E. Mooij, Delft University of Technology, Delft, The Netherlands | 1100 hrs<br>AIAA-2016-0629<br>**Development of an Air-Bearing Inclinable Turntable for Testing Tether Deployment**<br>U. Bindra, Z. Zhu, York University, North York, Canada | 1130 hrs<br>AIAA-2016-0630<br>**Flying Beacon Aided Entry Navigation for Mars Orbiter-Lander Integrated Mission**<br>T. Qin, S. Zhu, P. Cui, Beijing Institute of Technology, Beijing, China | |

| Tuesday, 5 January 2016 | | | | | | |
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| **134-GNC-13** | **Invited Session: LOC-3, Onboard Systems for LOC Prevention and Recovery – Resilient Flight Control and Guidance Systems** | | | | | **Coronado B** |
| Chaired by: D. CRIDER, National Transportation Safety Board and C. BELCASTRO, NASA-Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-0631<br>**L1 Stability Augmentation System for Calspan's Variable-Stability Learjet**<br>K. Ackerman, E. Xargay, R. Choe, N. Hovakimyan, University of Illinois, Urbana-Champaign, Urbana, IL; M. Cotting, R. Jeffrey, U.S. Air Force Test Pilot School, Edwards AFB, CA; et al. | 0930 hrs<br>AIAA-2016-0632<br>**'Can I Get L1 On?!' Providing Consistent Handling Qualities on Calspan's Variable-Stability Learjet**<br>M. Cotting, R. Jeffrey, M. Blackstun, T. Fulkerson, T. Lau, S. Stephens, Air Force Test Pilot School, Edwards AFB, CA; et al. | 1000 hrs<br>AIAA-2016-0633<br>**An L1 Adaptive Backup Flight Control Law for Transport Aircraft with Vertical-Tail Damage**<br>D. Sun, R. Choe, E. Xargay, N. Hovakimyan, University of Illinois, Urbana-Champaign, Urbana, IL | 1030 hrs<br>AIAA-2016-0634<br>**Safe Flight Using One Aerodynamic Control Surface**<br>R. Venkataraman, P. Seiler, University of Minnesota, Minneapolis, Minneapolis, MN | 1100 hrs<br>AIAA-2016-0635<br>**Robust Adaptive Control Allocation for an Octocopter under Actuator Faults**<br>H. Yoon, V. Cichella, N. Hovakimyan, University of Illinois, Urbana-Champaign, Urbana, IL | 1130 hrs<br>AIAA-2016-0636<br>**Online Pilot Model Parameter Estimation Using Sub-Scale Aircraft Flight Data**<br>T. Mandal, Y. Gu, West Virginia University, Morgantown, WV | |

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| **135-GNC-14** | **Aerospace Robotics and Unmanned/Autonomous Systems III** | | | | | **Hillcrest C** |
| Chaired by: B. TWEDDLE, Jet Propulsion Laboratory and K. SEWERYN, Space Research Centre Polish Academy of Sciences | | | | | | |
| 0900 hrs<br>AIAA-2016-0637<br>**A novel approach with safety metrics for real-time exploration of uncertain environments**<br>T. Mannucci, E. Van Kampen, C. de Visser, Q. Chu, Delft University of Technology, Delft, The Netherlands | 0930 hrs<br>AIAA-2016-0638<br>**Adaptive Step-length RRT Algorithm for Improved Coverage**<br>M. McCourt, C. Ton, S. Mehta, University of Florida, Shalimar, Shalimar, FL; J. Curtis, Air Force Research Laboratory, Eglin AFB, FL | 1000 hrs<br>AIAA-2016-0639<br>**A New Centrality Measure Based on Formation Response**<br>C. Robertson, A. Sinclair, Auburn University, Auburn, AL; E. Doucette, Air Force Research Laboratory, Eglin AFB, FL | 1030 hrs<br>AIAA-2016-0640<br>**Cohesive Autonomous Navigation System**<br>D. Kuether, Texas A&M University, College Station, TX; B. Morrell, University of Sydney, New South Wales, Australia; G. Chamitoff, M. Bishop, D. Mortari, Texas A&M University, College Station, TX; P. Gibbens, University of Sydney, New South Wales, Australia; et al. | 1100 hrs<br>AIAA-2016-0641<br>**Attitude Stabilization of an Uncooperative Spacecraft in an Orbital Environment using Visco-Elastic Tethers**<br>K. Hovell, S. Ulrich, Carleton University, Ottawa, Canada | 1130 hrs<br>AIAA-2016-0642<br>**Control analysis for a contactless de-tumbling method based on eddy currents: problem definition and approximate proposed solutions.**<br>N. Ortiz Gómez, S. Walker, Southampton University, Southampton, United Kingdom; M. Jankovic, DFKI, Bremen, Germany; J. Romero Martín, Strathclyde University, Glasgow, United Kingdom; F. Kirchner, DFKI, Bremen, Germany; M. Vasile, Strathclyde University, Glasgow, United Kingdom | |

| Tuesday, 5 January 2016 | | | | | | |
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| **136-GNC-15** | **Planning and Control for Mini/Micro UAVs** | | | | | **Hillcrest D** |
| Chaired by: A. LAMPTON, Systems Technology, Inc. and M. LIU, MIT - Massachusetts Institute of Technology | | | | | | |
| 0900 hrs<br>AIAA-2016-0643<br>**Observer Based Controllers for UAV Maneuver Options**<br>C. Ashokkumar, G. York , U.S. Air Force Academy, Colorado Springs, CO | 0930 hrs<br>AIAA-2016-0644<br>**Smooth Trajectory Planning for MAVs with Airspace Restrictions**<br>S. Upadhyay, A. Ratnoo, Indian Institute of Science, Bangalore, India | 1000 hrs<br>AIAA-2016-0645<br>**UAV Flight Test Evaluation of Fusion Algorithms for Estimation of Angle of Attack and Sideslip Angle**<br>P. Tian, H. Chao, University of Kansas, Lawrence, KS; Y. Gu, West Virginia University, Morgantown, WV; S. Hagerott, Textron Aviation, Wichita, KS | 1030 hrs<br>AIAA-2016-0646<br>**Rudder Augmented Trajectory Correction for Small Unmanned Aerial Vehicles and the Effects on Fixed Camera Imagery**<br>T. Fisher, R. Sharma, Utah State University, Logan, UT | 1100 hrs<br>AIAA-2016-0647<br>**Absolute Localization using Image Alignment and Particle Filtering**<br>G. Van Dalen, Delft University of Technology, Delft, The Netherlands ; D. Magree, E. Johnson, Georgia Institute of Technology, Atlanta, GA | | |

| Tuesday, 5 January 2016 | | | | | | |
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| **137-GT-3** | **High Reynolds Number Aerodynamics and Testing (Invited)** | | | | | **Harbor B** |
| Chaired by: R. PARYZ and J. QUEST, ETW GmbH | | | | | | |
| 0900 hrs<br>Oral Presentation<br>**Testing a Laminar Wing Bizjet Model at High Reynolds Number**<br>O. Colin, Dassault Group, Rueil-Malmaison, France | 0930 hrs<br>AIAA-2016-0648<br>**Force Measurement Improvements to the National Transonic Facility Sidewall Mounted Support System**<br>D. Butler, S. Balakrishna, ViGYAN, Inc., Hampton, VA; C. Cagle, D. Chan, NASA Langley Research Center, Hampton, VA; S. Goodliff, Jacobs, Hampton, VA; G. Jones, NASA Langley Research Center, Hampton, VA; et al. | 1000 hrs<br>Oral Presentation<br>**Overview of Data Quality from a Semi-Span Wind Tunnel Model Tested in NASA's National Transonic Facility at Transonic Conditions**<br>J. Hooker, A. Wick, Lockheed Martin Corporation, Acworth, GA; D. Chan, NASA Langley Research Center, Hampton, VA; R. Plumley, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1030 hrs<br>Oral Presentation<br>**Pretest and Setup Bay for High Reynolds Propulsion Airframe Integration Testing at the National Transonic Facility**<br>M. Acheson, R. Hudgins, G. Jones, NASA Langley Research Center, Hampton, VA | 1100 hrs<br>Oral Presentation<br>**Upgrades and Enhancements of the European Windtunnel (ETW)**<br>H. Quix, German Aerospace Center (DLR), Cologne, Germany | 1130 hrs<br>AIAA-2016-0649<br>**Application of Lifetime-based Pressure-Sensitive Paint Technique to Cryogenic Wind Tunnel Test**<br>D. Yorita, German Aerospace Center (DLR), Göttingen, Germany | 1200 hrs<br>AIAA-2016-0650<br>**Development of a Highly Sensitive Temperature-Sensitive Paint for Measurements under Cryogenic Temperatures (100 – 160 K) Conditions**<br>C. Klein, German Aerospace Center (DLR), Göttingen, Germany |

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| **138-GTE-4** | **Compression Systems II** | | | | | **Cortez Hill C** |
| Chaired by: R. BERDANIER, Purdue University and K. SUDER, NASA Glenn Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-0651<br>**Quantifying Blockage in a Multistage Compressor for Different Tip Clearances using Steady and Unsteady Pressure Measurements**<br>R. Berdanier, N. Key, Purdue University, West Lafayette, IN | 0930 hrs<br>AIAA-2016-0652<br>**Evaluation of New Blade Concept for Turbofan Engines**<br>A. Soueidan, R. LeBeau, Saint Louis University, St. Louis, MO | 1000 hrs<br>AIAA-2016-0653<br>**3-D Separation Control in a Linear Cascade with Diffusion**<br>C. Kleven, T. Corke, University of Notre Dame, Notre Dame, IN; D. Frias, D. Hanson, N. Nolcheff, Honeywell International, Inc., Phoenix, AZ | | | | |

| Tuesday, 5 January 2016 | | | | | | |
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| **139-GTE-5** | **Turbine Cooling I** | | | | | **Gaslamp D** |
| Chaired by: G. WOO, General Electric Global Research | | | | | | |
| 0900 hrs<br>AIAA-2016-0654<br>**Design of a High Pressure Turbine Nozzle Guide Vane with Effective Film Cooling System on Leading Edge**<br>F. Kiyici, T. Aksu, S. Uslu, TOBB University of Economics and Technology, Ankara, Turkey | 0930 hrs<br>AIAA-2016-0655<br>**Heat Transfer in a Rotating Two-pass Square Channel Representing Internal Cooling of Gas Turbine Blades**<br>R. Amano, S. Beyhaghi, University of Wisconsin, Milwaukee, Glendale, WI | | | | | |

| Tuesday, 5 January 2016 | | |
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| **140-HIS-1**<br>**0900 - 1230 hrs** | **Aerospace Archives: All is not Lost - Keepers of the Right Stuff** | **Americas Cup A** |

The AIAA History Technical Committee works to highlight the record of aerospace advances and recognize their impacts on modern society.To help dispel the myth that all the aerospace legacy materials of people and institutions have been lost, this session will provide a basic overview of what exists, where it is, and how it may be accessed. During this series of presentations, experts will talk about the collections of their respective organizations, "best practices" and the individual and institutional opportunities for preserving records.

Moderator: Cam Martin, NASA Armstrong Flight Research Center

Panelists:

**Joseph C. Anselmo**
Editor in Chief
Aviation Week & Space Technology

**William P. Barry**
Chief Historian
NASA

**Tom D. Crouch**
Senior Curator, National Air & Space Museum
Smithsonian Institution

**Brook Engebretson**
Aerospace History Project
Huntington-USC Institute on California and the West

**Tracy B. Grimm**
Barron Hilton Archivist for Flight and Space Exploration
Purdue University Libraries

**Katrina B. Pescador**
Director of Library & Archives
San Diego Air & Space Museum

**Stephanie M. Smith**
412th Test Wing History Office
Edwards AFB, California

| Tuesday, 5 January 2016 | | | | | | |
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| **141-HSABP-2** | **Scramjet Combustors** | | | | | **Regatta A** |
| Chaired by: R. HARTFIELD, Auburn University and O. POWELL | | | | | | |
| 0900 hrs<br>AIAA-2016-0656<br>**WIDECARS Measurements of a Premixed Ethylene-Air Flame in a Small-Scale Dual-Mode Scramjet Combustor**<br>E. Gallo, L. Cantu, A. Cutler, George Washington University, Washington, D.C.; R. Rockwell, C. Goyne, J. McDaniel, University of Virginia, Charlottesville, Charlottesville, VA | 0930 hrs<br>AIAA-2016-0657<br>**Dynamic Response of Supersonic Flow to Short Duration Normal Flow Injection**<br>C. Guarnaccio, Air Force Institute of Technology, Wright-Patterson AFB, OH; T. Ombrello, Air Force Research Laboratory, Wright-Patterson AFB, OH; B. Bentley, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1000 hrs<br>AIAA-2016-0658<br>**Establishing the Controlling Parameters of Ignition in High-Speed Flow**<br>T. Ombrello, C. Carter, Air Force Research Laboratory, Wright-Patterson AFB, OH; B. McGann, University of Notre Dame, Notre Dame, IN; H. Do, Seoul National University, Seoul, Korea (the Democratic People's Republic of); D. Peterson, Innovative Scientific Solutions, Inc., Dayton, OH | 1030 hrs<br>AIAA-2016-0659<br>**Common-Path Measurement of H2O, CO, and CO2 via TDLAS for Combustion Progress in a Hydrocarbon-Fueled Scramjet**<br>K. Busa, M. Brown, M. Gruber, Air Force Research Laboratory, Wright-Patterson AFB, OH; J. France, University of Michigan, Ann Arbor, MI | 1100 hrs<br>AIAA-2016-0660<br>**Fast Data Processing for Optical Absorption Measurements**<br>K. Busa, M. Brown, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1130 hrs<br>AIAA-2016-0661<br>**Ignition of Light Hydrocarbon Mixtures Relevant to Thermal Cracking of Jet Fuels**<br>P. Gokulakrishnan, C. Fuller, M. Klassen, Combustion Science & Engineering, Inc., Columbia, MD; Y. Zhu, D. Davidson, R. Hanson, Stanford University, Stanford, CA; et al. | 1200 hrs<br>AIAA-2016-0662<br>**Turbulent Diffusion Flux of Transverse Jet into Pseudo-Shock Wave**<br>T. Lee, Tohoku University, Sendai, Japan; T. Kouchi, Okayama University, Okayama, Japan; Y. Oka, G. Masuya, Tohoku University, Sendai, Japan |

| Tuesday, 5 January 2016 | | | | | | |
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| 142-IS-3<br>0900 - 1100 hrs | Big Data Analytics | | | | | Coronado A |
| **Sam Adhikari**<br>Sysoft and Rutgers University | **Dave Kasik**<br>The Boeing Company | **Manjula Ambur**<br>NASA Langley Research Center | **Anne Kao**<br>The Boeing Company | **Bryan Matthews**<br>NASA Ames Research Center | **Dragos Margineantu**<br>The Boeing Company | |

| Tuesday, 5 January 2016 | | |
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| 143-LEC-4<br>0900 - 1000 hrs | ASC Lecture | Harbor A |
| *Adaptive Aerospace Structures – An Air Force Perspective*<br>**Gregory W. Reich**<br>Air Force Research Laboratory, AFRL/RQVC | | |

| Tuesday, 5 January 2016 | | | | | | |
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| 144-MAT-4 | Materials Testing & Characterization II | | | | | Gaslamp B |
| Chaired by: J. RANSOM, NASA-Langley Research Center and R. NAIK, Pratt & Whitney | | | | | | |
| 0900 hrs<br>AIAA-2016-0663<br>**Effect of Silane Treated Electrospun $SiO_2$ Nanofibers Interleaving on Mode I Fracture Toughness of Glass Epoxy Composites**<br>V. Suryawanshi, L. Zhang, A. Kelkar, University of North Carolina, Greensboro, Greensboro, NC | 0930 hrs<br>AIAA-2016-0664<br>**Acoustic Emission Beamforming for Detecting and Localizing Damage in Composite Materials**<br>J. Rivey, G. Lee, J. Yang, University of Washington, Seattle, Seattle, WA; Y. Kim, SM Instruments, Daejeon, South Korea ; S. Kim, Korea Aerospace Research Institute (KARI), Daejeon, South Korea | 1000 hrs<br>AIAA-2016-0665<br>**Experimental Investigation of Laser Machining of Sapphire for High Temperature Pressure Transducers**<br>H. Bal, W. Oates, R. Kumar, Florida State University, Tallahassee, FL; D. Mills, M. Sheplak, University of Florida, Gainesville, Gainesville, FL | 1030 hrs<br>AIAA-2016-0666<br>**Comparisons between Forced-Response and Hysteretic Energy Damping Assessment Methods**<br>O. Scott-Emuakpor, B. Langley, C. Holycross, T. George, B. Runyon, J. Justice, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1100 hrs<br>AIAA-2016-0667<br>**Numerical Determination of Mechanical Properties for Flexible Material Systems**<br>J. Hill, R. Braun, Georgia Institute of Technology, Atlanta, GA | 1130 hrs<br>AIAA-2016-0668<br>**Development of creep-dominant creep-fatigue testing for Alloy 617**<br>F. Tahir, Y. Liu, Arizona State University, Tempe, AZ | |

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| 145-MDO-3 | Propulsion & Thermal Design Considerations | | | | | Balboa A |
| Chaired by: D. ALLISON, Optimal Flight Sciences LLC and G. RUSSELL | | | | | | |
| 0900 hrs<br>AIAA-2016-0669<br>**Thermodynamics For Gas Turbine Cycles With Analytic Derivatives in OpenMDAO**<br>J. Gray, J. Chin, T. Hearn, E. Hendricks, T. Lavelle, NASA Glenn Research Center, Cleveland, OH; J. Martins, University of Michigan, Ann Arbor, Ann Arbor, MI | 0930 hrs<br>AIAA-2016-0670<br>**Fuel Thermal Management System Consideration in Conceptual Design Sizing**<br>E. Alyanak, Air Force Research Laboratory, Wright-Patterson AFB, OH; D. Allison, Optimal Flight Sciences, LLC, Dayton, OH | 1000 hrs<br>AIAA-2016-0671<br>**Aircraft System Affects Including Propulsion and Air Cycle Machine Coupled Interactions**<br>D. Allison, Optimal Flight Sciences, LLC, Dayton, OH; E. Alyanak, Air Force Research Laboratory, Wright-Patterson AFB, OH; K. Shimmin, PC Krause and Associates, West Lafayette, IN | 1030 hrs<br>AIAA-2016-0672<br>**Impact of High Energy Pulsed Systems on an Aircraft's Power and Thermal Management System**<br>R. Roberts, A. Donovan, S. Nuzum, M. Wolff, Wright State University, Dayton, OH | 1100 hrs<br>AIAA-2016-0673<br>**An Aerospace Vehicle Model Including a Cryogenic Thermal Subsystem**<br>S. Nuzum, R. Roberts, M. Wolff, Wright State University, Dayton, OH | 1130 hrs<br>AIAA-2016-0674<br>**An Overview of the Optimized Integrated Multidisciplinary Systems Program**<br>R. Reuter, S. Iden, R. Snyder, D. Allison, Air Force Research Laboratory, Wright-Patterson AFB, OH | |

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| **146-MST-4** | **Modeling of Space Systems and Dynamics** | | | | | **Golden Hill A** |
| Chaired by: A. HIMMLER, dSPACE, Inc. and D. KEATING | | | | | | |
| 0900 hrs<br>AIAA-2016-0675<br>**Optimal Attitude Control of Agile Spacecraft Using Combined Reaction Wheel and Control Moment Gyroscope Arrays**<br>C. Doupe, E. Swenson, Air Force Institute of Technology, Wright-Patterson AFB, OH | 0930 hrs<br>AIAA-2016-0676<br>**High-Fidelity General-Purpose Robotic Simulation Framework for Artificially Intelligent Space Exploration Vehicles**<br>S. Walker, J. Shan, York University, Toronto, Canada | 1000 hrs<br>AIAA-2016-0677<br>**A Method for Launch Vehicle Performance Analysis via Surrogate Modeling**<br>M. Steffens, S. Edwards, D. Mavris, Georgia Institute of Technology, Atlanta, GA; P. Dees, Jacobs, Huntsville, AL; M. Diaz, Georgia Institute of Technology, Atlanta, GA | 1030 hrs<br>AIAA-2016-0678<br>**Modeling SMAP Spacecraft Attitude Control Estimation Error Using Signal Generation Model**<br>F. Rizvi, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | 1100 hrs<br>AIAA-2016-0679<br>**Empirical Data Driven Model for Shape and Dynamics Estimation of Large Deployable Membrane Space Structure**<br>M. Yamazaki, Nihon University, Chiba, Japan | | |

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| **147-NDA-2** | **Analysis and Optimization Under Uncertainty** | | | | | **Old Town B** |
| Chaired by: S. DORMOHAMMADI and P. WANG, Wichita State University | | | | | | |
| 0900 hrs<br>AIAA-2016-0680<br>**Multi-fidelity Methods in Aerodynamic Robust Optimization**<br>A. Padron, J. Alonso, Stanford University, Stanford, CA; M. Eldred, Sandia National Laboratories, Albuquerque, NM | 0930 hrs<br>AIAA-2016-0681<br>**Incorporation of Risk Preferences in a Value-Based Systems Engineering Framework for a Satellite System**<br>H. Kannan, Iowa State University, Ames, IA; B. Mesmer, University of Alabama, Huntsville, Huntsville, AL; C. Bloebaum, Iowa State University, Ames, IA | 1000 hrs<br>AIAA-2016-0682<br>**Probabilistic Design Analysis of Bellows Type Pogo Accumulator**<br>D. Ransom, Southwest Research Institute, San Antonio, TX | 1030 hrs<br>AIAA-2016-0683<br>**Using Normalized Parameter Perturbations to Investigate Design, Sensitivity Analysis, and Uncertainty Quantification**<br>E. Forster, P. Beran, R. Kolonay, Air Force Research Laboratory, Wright-Patterson AFB, OH; H. Bae, Wright State University, Dayton, OH | 1100 hrs<br>AIAA-2016-0684<br>**Application of Bayesian Theory to Interval Based Representation of Epistemic Uncertainty for a Decomposed Multilevel Optimization Framework**<br>I. Dettwiller, M. Rais-Rohani, Mississippi State University, Mississippi State, MS | | |

| Tuesday, 5 January 2016 | | |
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| **148-NW-7**<br>**0900 - 0930 hrs** | **Tuesday Late Morning Networking Coffee Break** | **Session Room Foyers** |

| Tuesday, 5 January 2016 | | | | | | |
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| **149-PC-6** | **Heterogeneous Propellants and Combustion, Fuel Technology** | | | | | **Harbor C** |
| Chaired by: A. GNANASKANDAN, Jet Propulsion Laboratory and T. JACKSON, University of Florida Gainesville | | | | | | |
| 0900 hrs<br>AIAA-2016-0685<br>**Microwave-Supported Plasma Combustion Enhancement of Composite Solid Propellants Using Alkali Metal Dopants**<br>J. Lynch, M. Ballestero, R. Cazin, J. Michael, T. Sippel, Iowa State University, Ames, IA | 0930 hrs<br>AIAA-2016-0686<br>**Combustion of Sonochemically-Generated Amorphous Reactive Mixed-Metal Nanopowders in an n-Decane Spray Flame**<br>M. Weismiller, B. Fisher, Z. Huba, A. Epshteyn, S. Tuttle, B. Williams, Naval Research Laboratory, Washington, D.C. | 1000 hrs<br>AIAA-2016-0687<br>**Size-Resolved Burn Rate Measurements of Metal NanoParticles**<br>R. Jacob, Y. Zong, Y. Yang, University of Maryland, College Park, College Park, MD; S. Li, Tsinghua University, Beijing, China; M. Zachariah, University of Maryland, College Park, College Park, MD | 1030 hrs<br>AIAA-2016-0688<br>**Direct-Deposition to Create High Particle Loading Propellants with Controlled Architecture: Combustion and Mechanical Properties**<br>X. Li, M. Zachariah, University of Maryland, College Park, College Park, MD | 1100 hrs<br>AIAA-2016-0689<br>**Functional Group Analysis of Evaporation and Liquid Combustion of Jet-A and Its Surrogate Fuel Based On Quantitative FT-IR Measurements**<br>Y. Liu, B. Walker, University of Michigan, Flint, Flint, MI | 1130 hrs<br>AIAA-2016-0690<br>**The effect of fuel composition on the non-premixed flame structure of LNG/LOx mixtures at supercritical pressure**<br>P. Lapenna, P. Ciottoli, F. Creta, University of Rome "La Sapienza", Rome, Italy | 1200 hrs<br>AIAA-2016-0691<br>**Three-dimensional Structures in Hypergolic Ignition Process and Flame Holding Mechanisms for Hydrazine/Nitrogen Dioxide Unlike Doublet Impinging Gas Jets**<br>Y. Daimon, H. Tani, Japan Aerospace Exploration Agency (JAXA), Tsukuba, Japan; H. Terashima, University of Tokyo, Tokyo, Japan; M. Koshi, Yokohama National University, Yokohama, Japan |

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| 150-PDL-5/PC-7/AMT-3 | Special Walter Lempert Memorial Session I (Invited) | | | | | Harbor D |
| Chaired by: R. MILES, Princeton University and I. ADAMOVICH, Ohio University | | | | | | |
| 0900 hrs<br>Oral Presentation<br>**"It's Amazing What You May See If You Only Look": Walter Lempert's Legacy in Science.**<br>I. Adamovich, Ohio State University, Columbus, OH | 0930 hrs<br>Oral Presentation<br>**What we learned from Walter Lempert**<br>S. Macheret, Purdue University, West Lafayette, IN; R. Yetter, Pennsylvania State University, University Park, PA | 1000 hrs<br>Oral Presentation<br>**Nice Guys Can Finish First: Walter Lempert's Legacy of Scholarship and Comradeship**<br>C. Carter, Air Force Research Laboratory, Wright-Patterson AFB, OH; G. Elliott, University of Illinois, Urbana-Champaign, Urbana, IL | 1030 hrs<br>Oral Presentation<br>**Remembering Prof. Walter Lempert**<br>J. Tishkoff, Air Force Office of Scientific Research, Arlington, VA; M. Gundersen, University of Southern California, Los Angeles, CA | 1100 hrs<br>Oral Presentation<br>**Plasma Assisted Low Temperature Combustion**<br>Y. Ju, J. Lefkowitz, Princeton University, Princeton, NJ | 1130 hrs<br>Oral Presentation<br>**Short Pulses, Big Impact: Walter Lempert and ns Discharge Kinetics**<br>M. Kushner, University of Michigan, Ann Arbor, Ann Arbor, MI | |

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| 151-SATS-1 | Small Satellites - Technologies I | | | | | Ocean Beach |
| Chaired by: J. STRAUB, University of North Dakota | | | | | | |
| 0900 hrs<br>AIAA-2016-0692<br>**Micro Pulsed Plasma Thrusters for Attitude Control of a Low Earth Orbiting CubeSat**<br>N. Gatsonis, Y. Lu, J. Blandino, M. Demetriou, Worcester Polytechnic Institute, Worcester, MA; N. Paschalidis, NASA Goddard Space Flight Center, Greenbelt, MD | 0930 hrs<br>AIAA-2016-0693<br>**Spherical Reaction Wheel System For Satellite Attitude Control**<br>H. Paku, R. Takehana, K. Uchiyama, Nihon University, Funabashi, Japan | 1000 hrs<br>AIAA-2016-0694<br>**Designing, Building, and Testing a Mesh Ka-band Parabolic Deployable Antenna (KaPDA) for CubeSats**<br>J. Sauder, N. Chahat, R. Hodges, E. Peral, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; Y. Rahmat-Samii, University of California, Los Angeles, Los Angeles, CA; M. Thomson, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | 1030 hrs<br>AIAA-2016-0695<br>**Electrical Power System of SRMSAT - 2**<br>S. Pavuluri, SRM University, Kattankulathur, India | 1100 hrs<br>AIAA-2016-0696<br>**Fabrication of Asymmetric Nanostructures for Plasmonic Force Propulsion**<br>J. Maser, J. Rovey, X. Yang, Missouri University of Science and Technology, Rolla, MO | 1130 hrs<br>AIAA-2016-0697<br>**Implementation of three DoFs small satellite ground simulation system**<br>H. Yao, Y. Wang, J. Cui, J. Bao, H. Yang, Z. Zhu, Tsinghua University, Beijing, China; et al. | |

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| 152-SCS-1 | Spacecraft Antennas and Apertures | | | | | Balboa B |
| Chaired by: M. SILVER, MIT Lincoln Laboratory and H. FANG | | | | | | |
| 0900 hrs<br>AIAA-2016-0698<br>**System Design Study of a Deployable Reflector Antenna with Flexible Shell Segments**<br>J. Footdale, LoadPath, LLC, Albuquerque, NM; J. Banik, Air Force Research Laboratory, Kirtland AFB, NM | 0930 hrs<br>AIAA-2016-0699<br>**Measuring Critical Alignments of the James Webb Space Telescope Aft Optics Subsystem**<br>A. Barto, B. Gallagher, J. Knight, K. Smith, Ball Aerospace & Technologies Corporation, Boulder, CO | 1000 hrs<br>AIAA-2016-0700<br>**Design and Deployment Testing of the Multi-Arm Radial Composite (MARCO) Reflector Antenna**<br>J. Footdale, LoadPath, LLC, Albuquerque, NM; J. Banik, Air Force Research Laboratory, Kirtland AFB, NM | 1030 hrs<br>AIAA-2016-0701<br>**Concept Design of 15m class Light Weight Deployable Antenna Reflector for L-band SAR Application**<br>K. Nakamura, N. Nakamura, Technosolver Corporation, Fujisawa, Japan; S. Ozawa, A. Uematsu, H. Hoshino, T. Kimura, Japan Aerospace Exploration Agency (JAXA), Tsukuba, Japan | 1100 hrs<br>AIAA-2016-0702<br>**Energy-Efficient Active Reflectors with Improved Mechanical Stability and Improved Thermal Performance**<br>S. Bradford, D. Hofmann, S. Roberts, J. Steeves, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; C. Wojnar, Missouri University of Science and Technology, Rolla, MO; D. Kochmann, California Institute of Technology, Pasadena, CA | 1130 hrs<br>AIAA-2016-0703<br>**Shape-Control Experiment of Space Reconfigurable Reflector Using Antenna Reception Power**<br>H. Sakamoto, Tokyo Institute of Technology, Tokyo, Japan; H. Tanaka, National Defense Academy of Japan, Kanagawa, Japan; K. Ishimura, A. Doi, Japan Aerospace Exploration Agency (JAXA), Kanagawa, Japan; Y. Kono, N. Matsumoto, National Astronomical Observatory of Japan, Tokyo, Japan; et al. | 1200 hrs<br>AIAA-2016-0704<br>**Shape Control of a Reflector Based on Generalized Zernike Functions**<br>L. Lan, S. Jiang, Y. Zhou, H. Fang, Shanghai YS Information Technology Co., Ltd., Shanghai, China; Z. Wu, J. Du, Dalian University of Technology, Dalian, China |

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| **153-SD-5** | **Turbomachinery / Structural Health Monitoring** | | | | | **Balboa C** |
| Chaired by: D. JOHNSON, NASA Glenn Research Center and J. BLACK, Virginia Tech | | | | | | |
| 0900 hrs<br>AIAA-2016-0705<br>**Analysis of Damage Assessment of Large Hailstone Ingestion into Advanced High Bypass Propulsion system**<br>Y. Song, J. Bayandor, Virginia Polytechnic Institute and State University, Blacksburg, VA | 0930 hrs<br>AIAA-2016-0706<br>**Reduced Order Geometric Mistuning Models using Principal Component Analysis Approximations**<br>E. Henry, J. Brown, Air Force Research Laboratory, Wright-Patterson AFB, OH; J. Beck, Perceptive Engineering Analytics, Lino Lakes, MN | 1000 hrs<br>AIAA-2016-0707<br>**The Development of an Active Damping and Stiffness Technique for Turbomachinery using Shape Memory Alloys**<br>R. Wischt, N. Garafolo, University of Akron, Akron, OH | 1030 hrs<br>AIAA-2016-0708<br>**Evaluation of Fiber Optic Strain Sensors for Applications in Structural Health Monitoring**<br>B. Martins, J. Kosmatka, University of California, San Diego, La Jolla, CA | 1100 hrs<br>AIAA-2016-0709<br>**Frequency Domain Statistical Damage Identification Development and Analytical Study**<br>J. Oliver, J. Kosmatka, C. Farrar, J. Conte, University of California, San Diego, La Jolla, CA | 1130 hrs<br>AIAA-2016-0710<br>**Frequency Domain Statistical Damage Identification Applied to an Experimental Composite Plate**<br>J. Oliver, J. Kosmatka, C. Farrar, J. Conte, University of California, San Diego, La Jolla, CA | |

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| **154-SD-6** | **Dynamics, Feedback Control, and Aeroservoelasticity I** | | | | | **Gaslamp A** |
| Chaired by: S. SMITH, University of Kentucky and J. MCNAMARA, The Ohio State University | | | | | | |
| 0900 hrs<br>AIAA-2016-0711<br>**Model-Predictive Control of Flexible Aircraft Dynamics using Nonlinear Reduced-Order Models**<br>Y. Wang, A. Wynn, R. Palacios, Imperial College London, London, United Kingdom | 0930 hrs<br>AIAA-2016-0712<br>**Optimal Selection of Control Surfaces for Active Aeroelastic Control of Prescribed Modes**<br>R. Brown, K. Singh, Miami University, Oxford, OH | 1000 hrs<br>AIAA-2016-0713<br>**Inverse Dynamics for Deceleration Control of Deployment of Linked Panel Structure in Space**<br>M. Takatsuka, Nagoya University, Nagoya, Japan | 1030 hrs<br>AIAA-2016-0714<br>**Feedback control of integrally actuated membrane wings: a computational study**<br>S. Buoso, R. Palacios, Imperial College London, London, United Kingdom | 1100 hrs<br>AIAA-2016-0715<br>**Active Piezoelectric Actuation and Control of Highly Flexible Multifunctional Wings**<br>N. Tsushima, W. Su, University of Alabama, Tuscaloosa, Tuscaloosa, AL | 1130 hrs<br>AIAA-2016-0716<br>**Spacecraft Docking with Type II Superconductor Flux Pinning and Potential Energy Capture**<br>R. Caracciolo, F. Zhu, M. Peck, Cornell University, Ithaca, NY | |

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| **155-SRE-2** | **ISRU technologies and trades** | | | | | **Bankers Hill** |
| Chaired by: L. GERTSCH, Missouri University of Science and Technology and D. LINNE, NASA Glenn Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-0717<br>**Solar System Exploration Augmented by In-Situ Resource Utilization: Mercury and Saturn Propulsion Investigations**<br>B. Palaszewski, NASA Glenn Research Center, Cleveland, OH | 0930 hrs<br>AIAA-2016-0718<br>**Sampling of Regolith from Asteroids Utilizing Magnetic Force**<br>M. Adachi, R. Obata, A. Shigeta, H. Kawamoto, Waseda University, Tokyo, Japan | 1000 hrs<br>AIAA-2016-0719<br>**Dynamic Elasto-Plastic Impact Force in a Special Planetary Drilling Mechanism**<br>R. Malla, L. Vila, University of Connecticut, Storrs, Storrs, CT | 1030 hrs<br>AIAA-2016-0720<br>**Aquaponics: An Option for In-situ Production of Mission Consumables**<br>K. Kalbacher de Marquez, E. Marquez Gonzalez, Autonomous University of Chihuahua, Chihuahua, Mexico | 1100 hrs<br>AIAA-2016-0721<br>**Liquefaction and Storage of In-Situ $O_2$ on the surface of Mars**<br>D. Hauser, W. Johnson, NASA Glenn Research Center, Cleveland, OH | | |

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| **156-STR-4** | **Special Session: USAF Benchmarking of Composite Fatigue Prediction Methods** | | | | | **La Jolla A** |
| Chaired by: S. CLAY and S. ENGELSTAD, Lockheed Martin Aeronautics | | | | | | |
| 0900 hrs<br>AIAA-2016-0722<br>**Assessment of Multiscale Design System for Fatigue Life Prediction of Advanced Composite Aircraft Structures**<br>J. Fish, Columbia University, New York, NY; Z. Yuan, J. Wollschlager, Altair Engineering, Inc., Troy, MI | 0930 hrs<br>AIAA-2016-0723<br>**Fatigue Damage Prediction in Quasi-Isotropic Open-Hole Tension Coupon using the Kinetic Theory of Fracture**<br>R. Dalgarno, D. Robbins, AutoDesk, Inc., Laramie, WY; J. Action, S. Engelstad, Lockheed Martin Corporation, Marietta, GA | 1000 hrs<br>AIAA-2016-0724<br>**3D delamination profile reconstruction for composite laminates using inverse heat conduction**<br>T. Peng, Y. Liu, Arizona State University, Tempe, AZ | 1030 hrs<br>AIAA-2016-0725<br>**Assessment of Composite Damage Growth Tools for Aircraft Structure Part II**<br>S. Engelstad, Lockheed Martin Corporation, Marietta, GA; S. Clay, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1100 hrs<br>AIAA-2016-0726<br>**Progressive Failure Simulation in Laminated Composites under Fatigue Loading by Using Discrete Damage Modeling**<br>K. Hoos, University of Dayton Research Institute, Dayton, OH; E. Iarve, University of Texas, Arlington, Arlington, TX; M. Braginsky, E. Zhou, University of Dayton Research Institute, Dayton, OH; D. Mollenhauer, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1130 hrs<br>AIAA-2016-0727<br>**A Continuum Damage and Discrete Crack Approach for Fatigue Damage Prediction of Laminated Composites**<br>E. Fang, X. Cui, J. Lua, Global Engineering and Materials, Inc., Princeton, NJ | 1200 hrs<br>AIAA-2016-0728<br>**A Micromechanical Approach to Low Cycle Fatigue Analysis and Life Prediction of Heterogeneous Materials**<br>H. Sertse, W. Yu, Purdue University, West Lafayette, IN |

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| **157-STR-5** | **Failure Analysis and Prediction I** | | | | | **La Jolla B** |
| Chaired by: A. PALAZOTTO and L. HARDAWAY, Ball Aerospace & Technologies Corporation | | | | | | |
| 0900 hrs<br>AIAA-2016-0729<br>**Micro-Scale Crack Propagation Using the eXtended Finite Element Method**<br>V. Goyal, R. Jorge, University of Puerto Rico, Mayaguez, | 0930 hrs<br>AIAA-2016-0730<br>**The EST Model for Predicting Progressive Damage and Failure of Open Hole Bending Specimens**<br>A. Joseph, University of Michigan, Ann Arbor, Ann Arbor, MI; A. Waas, University of Washington, Seattle, Seattle, WA; E. Pineda, NASA Glenn Research Center, Cleveland, OH | 1000 hrs<br>AIAA-2016-0731<br>**Effect of Strength Variation Along a Single Fiber on Micro-Scale Damage Development in UD-FRPs**<br>N. Parambil, K. Fathima, S. Gururaja, Indian Institute of Science, Bangalore, India | 1030 hrs<br>AIAA-2016-0732<br>**A Comparative Study of Local and Nonlocal Domain Integration for XFEM Based Stress Intensity Factor Extraction for Fatigue Life Prediction**<br>X. Ren, A. Sadeghirad, N. Simon, J. Lua, Global Engineering and Materials, Inc., Princeton, NJ | 1100 hrs<br>AIAA-2016-0733<br>**Effect of Notch on the Failure Response of Oxide/Oxide Ceramic Composites**<br>D. Zhang, University of Connecticut, Storrs, Storrs, CT; P. Meyer, University of Michigan, Ann Arbor, MI; A. Waas, University of Washington, Seattle, Seattle, WA | 1130 hrs<br>AIAA-2016-0734<br>**In situ study of static and dynamic strain energy density at notch roots and fatigue cracks using digital image correlation**<br>C. Holycross, H. Shen, Ohio State University, Columbus, OH; O. Scott-Emuakpor, T. George, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1200 hrs<br>AIAA-2016-0735<br>**A Selectively Activated Continuum-Coupled Extrinsic Cohesive Model**<br>W. Peterson, D. Cairns, Montana State University, Bozeman, MT |

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| **158-TES-4**<br>**0900 - 1230 hrs** | **Electrochemical Power for Aerospace Missions** | **Gaslamp C** |
| Moderator: Farzad Mashayek, University of Illinois, Chicago | | |
| *Space lithium ion battery problems and future mission needs*<br>**Rao Surampudi**<br>NASA Jet Propulsion Laboratory | *Materials Challenges and Opportunities for Energy Storage at Extremely Low Temperatures*<br>**Shirley Meng**<br>University of California, San Diego | ESA/ITT Project, *Electrochemical Phenomena in Microgravity*<br>**Vadim Lvovich**<br>NASA Glenn Research Center |
| *Development and testing of advanced energy storage systems at UC San Diego for power system*<br>**William Torre**<br>University of California, San Diego | *Lithium Deposition Issues in Zero G* and/or *Electrolysis Challenges in Zero G*<br>**Yasuhiro Fukunaka**<br>Waseda University | *Developments and opportunities for fuel cells*<br>**Thomas Fuller**<br>Georgia Institute of Technology |

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| **159-TP-5** | **Aerothermodynamics I** | | | | | **Harbor G** |
| Chaired by: M. BARNHARDT, NASA-Ames and X. WANG, Air Force Research Laboratory | | | | | | |
| 0900 hrs<br>AIAA-2016-0736<br>**High Fidelity Modeling of Thermal Relaxation and Dissociation of Oxygen**<br>D. Andrienko, I. Boyd, University of Michigan, Ann Arbor, Ann Arbor, MI | 0930 hrs<br>AIAA-2016-0737<br>**Assessment of Vibrational Nonequilibrium for State Resolved Simulation of a Hypersonic Flow**<br>J. Burt, E. Josyula, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1000 hrs<br>AIAA-2016-0738<br>**Uncertainty and Sensitivity Analysis of Afterbody Radiative Heating Predictions for Earth Entry**<br>T. West, NASA Langley Research Center, Hampton, VA; S. Hosder, Missouri University of Science and Technology, Rolla, MO; C. Johnston, NASA Langley Research Center, Hampton, VA | 1030 hrs<br>AIAA-2016-0739<br>**Analysis of CO2 Plasma Infrared Radiation Measurements**<br>S. Nishimura, University of Shizuoka, Shizuoka, Japan; A. Lemal, H. Takayanagi, S. Nomura, S. Matsuyama, K. Fujita, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan | 1100 hrs<br>AIAA-2016-0740<br>**Analysis of VUV radiation measurements from high temperature air mixtures**<br>A. Lemal, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; S. Nishimura, Shizuoka University, Shizuoka, Japan; S. Nomura, H. Takayanagi, S. Matsuyama, K. Fujita, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan | 1130 hrs<br>AIAA-2016-0741<br>**Radiative Gas Dynamics of Large Superorbital Space Vehicle at Angle of Attack**<br>S. Surzhikov, Russian Academy of Sciences, Moscow, Russia | 1200 hrs<br>AIAA-2016-0742<br>**Radiative Gas Dynamics of MSL at Angle of Attack**<br>S. Surzhikov, Russian Academy of Sciences, Moscow, Russia |

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| **160-UMS-3** | **Unmanned Systems: Missions and Applications** | | | | | **Regatta C** |
| Chaired by: R. STANSBURY, Embry-Riddle Aeronautical University and J. VALASEK, Texas A&M University | | | | | | |
| 0900 hrs<br>AIAA-2016-0743<br>**A Dual-Use Unmanned Aerial System for Precision Agriculture and Search and Rescue Applications**<br>A. Weber, University of Michigan, Ann Arbor, Ann Arbor, MI; N. Lauer, University of Maryland, College Park, College Park, MD; J. Brady, University of Alaska, Anchorage, Anchorage, AK; C. Branyan, University of Arizona, Tucson, Tucson, AZ; M. Goodstein, State University of New York, Buffalo, NY; A. Gupta, Purdue University, West Lafayette, IN; et al. | 0930 hrs<br>AIAA-2016-0744<br>**Flight Analysis of an Autonomous Parafoil Recovery System for High Altitude Descent Systems**<br>J. Chin, NASA Glenn Research Center, Cleveland, OH; S. Dunker, D. Montague, Airborne Systems, Santa Ana, CA; J. Niehaus, D. Goodenow, NASA Glenn Research Center, Cleveland, OH | 1000 hrs<br>AIAA-2016-0745<br>**Unmanned Aircraft Operations at Texas A&M University – Corpus Christi**<br>D. Bridges, Texas A&M University, Corpus Christi, TX; D. Yoel, American Aerospace Advisors, Inc., Radnor, PA | 1030 hrs<br>AIAA-2016-0746<br>**Dynamic Re-plan of the Loyal Wingman Optimal Control Problem in a Changing Mission Environment**<br>C. Humphreys, R. Cobb, D. Jacques, J. Reeger, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1100 hrs<br>AIAA-2016-0747<br>**UAV-carried Long-distance Wi-Fi Communication Infrastructure**<br>J. Xie, University of North Texas, Denton, TX; F. Al-Emrani, Amazon.com, Denton, TX; Y. Gu, Y. Wan, S. Fu, University of North Texas, Denton, TX | | |

| Tuesday, 5 January 2016 | | | | | | |
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| **161-WE-2** | **Wind Energy: Wind Turbine Aerodynamics Modeling I** | | | | | **Harbor H** |
| Chaired by: S. SCHRECK, NREL | | | | | | |
| 0900 hrs<br>AIAA-2016-0748<br>**Improving Airfoil Drag Prediction**<br>G. Ramanujam, University of Twente, Enschede, The Netherlands ; H. Ozdemir, ECN, Petten, The Netherlands ; H. Hoeijmakers, University of Twente, Enschede, The Netherlands | 0930 hrs<br>AIAA-2016-0749<br>**Higher-Order Accurate Simulations of Wind Turbine Flow Fields: A Poor Man's Approach**<br>K. Sreenivas, A. Mittal, L. Taylor, L. Hereth, University of Tennessee, Chattanooga, Chattanooga, TN | 1000 hrs<br>AIAA-2016-0750<br>**Aeroacoustic Calculations of Wind Turbine Noise with the Actuator Line/ Navier-Stokes Technique**<br>H. Debertshaeuser, W. Shen, W. Zhu, Technical University of Denmark, Lyngby, Denmark | 1030 hrs<br>AIAA-2016-0751<br>**Analytical actuator disc solution for unsteady load**<br>W. Yu, C. Simao Ferreira, G. van Kuik, Delft University of Technology, Delft, The Netherlands | 1100 hrs<br>AIAA-2016-0752<br>**Analytical Method to Determine a Tip Loss Factor for Highly-Loaded Wind Turbine Rotors**<br>S. Schmitz, Pennsylvania State University, University Park, PA; D. Maniaci, Sandia National Laboratories, Albuquerque, NM | | |

| Tuesday, 5 January 2016 | | | | | | |
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| **162-WE-3** | **Wind Energy: Structural Dynamics and Materials** | | | | | **Harbor I** |
| Chaired by: D. CAIRNS, Montana State University | | | | | | |
| 0900 hrs<br>AIAA-2016-0753<br>**Partitioned nonlinear structural analysis of wind turbines using BeamDyn**<br>Q. Wang, M. Sprague, J. Jonkman, National Renewable Energy Laboratory, Golden, CO | 0930 hrs<br>AIAA-2016-0754<br>**The Usage of Parameterized Fatigue Spectra and Physics-Based Systems Engineering Models for Determination of Wind Turbine Component Sizing**<br>T. Parsons, P. Veers, Y. Guo, National Renewable Energy Laboratory, Golden, CO | 1000 hrs<br>AIAA-2016-0755<br>**Fracture and Fatigue of Thick Adhesive Joints in Wind Turbine Blade Structures**<br>D. Cairns, Montana State University, Bozeman, MT | 1030 hrs<br>AIAA-2016-0756<br>**Influence of Fabric Architecture on Damage Progression Evidenced by Acoustic Emission Measurements**<br>D. Miller, D. Samborsky, D. Cairns, M. Schuster, A. Lolatte, Montana State University, Bozeman, MT | | | |

| Tuesday, 5 January 2016 | | |
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| **163-PANEL-4**<br>**0930 - 1130 hrs** | **Tuesday Morning Forum 360**<br>**Innovation in Space: How Researchers Can Leverage the ISS National Laboratory for Pioneering Research & Development** | **Seaport F-G** |

Moderator: Greg Johnson, President & Executive Director, Center for the Advancement of Science in Space (CASIS)

Panelists:

**Andrew Rush**
President
Made In Space, Inc.

**Dan Blaettler**
Senior Program Manager
Center for the Advancement of Science in Space (CASIS)

**George Nelson**
Manager, ISS Technology and Science Research Office
NASA Johnson Space Center

| Tuesday, 5 January 2016 | | |
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| 164-PANEL-5<br>1030 - 1230 hrs | ASC: Where's My Morphing Aircraft? Reflections Based on Twenty Years of Adaptive Aerostructures | Harbor A |

Moderator: Farhan Gandhi, Rosalind and John J. Redfern Jr. '33 Endowed Chair in Aerospace Engineering, and Aerospace Program Director, Rensselaer Polytechnic Institute

Panelists:

**Jayanth Kudva**, NextGen Aeronautics
**Edward White**, The Boeing Company
**Friedrich Straub**, The Boeing Company
**Daniel Newman**, The Boeing Company

| Tuesday, 5 January 2016 | | |
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| 165-IS-4<br>1100 - 1230 hrs | Intelligent Systems Autonomy Roadmap Panel | Coronado A |

Panel Chairs: Nhan Nguyen, NASA Ames Research Center, Christopher Tschan, The Aerospace Corporation

Panelists:

**Ella Atkins**, University of Michigan
**Danette Allen**, NASA Langley Research Center
**John Valasek**, Texas A&M University

| Tuesday, 5 January 2016 | | |
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| 166-LUNCH-2<br>1230 - 1400 hrs | Recognition Luncheon: Celebrating Achievements in Aerospace Sciences and Information Systems | Seaport A-E |

| Tuesday, 5 January 2016 | | | | | | |
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| 167-AA-4 | Computational Aeroacoustics II | | | | | Nautical |
| Chaired by: X. LI, Beihang University and S. ARUNAJATESAN, Sandia National Labs | | | | | | |
| 1400 hrs<br>AIAA-2016-0757<br>**Linking Lagrangian & Acoustic Wave Dynamics via Finite-Time Lyapunov Exponent Fields**<br>D. Gonzalez, Naval Surface Warfare Center, Indian Head, MD; R. Speth, D. Gaitonde, Ohio State University, Columbus, OH; M. Lewis, Institute for Defense Analyses, Washington, D.C. | 1430 hrs<br>AIAA-2016-0758<br>**Numerical Simulations for Supersonic Jet Noise Reduction Using Fluidic Inserts**<br>M. Kapusta, R. Powers, P. Morris, D. McLaughlin, Pennsylvania State University, University Park, PA | 1500 hrs<br>AIAA-2016-0759<br>**Effect of Flow-Acoustic Resonant Interactions on Aerodynamic Response of Transitional Airfoils**<br>V. Golubev, J. Hayden, L. Nguyen, S. Salehian, R. Mankbadi, Embry-Riddle Aeronautical University, Daytona Beach, FL; C. Pasiliao, Air Force Research Laboratory, Eglin AFB, FL; et al. | 1530 hrs<br>AIAA-2016-0760<br>**Numerical Investigations of Bio-Inspired Blade Designs to Reduce Broadband Noise in Aircraft Engines and Wind Turbines**<br>B. Agrawal, A. Sharma, Iowa State University, Ames, IA | 1600 hrs<br>AIAA-2016-0761<br>**Investigation of the mechanisms of jet-engine core noise using large-eddy simulation**<br>J. O'Brien, J. Kim, M. Ihme, Stanford University, Stanford, CA | 1630 hrs<br>AIAA-2016-0762<br>**Coupled Overset Unstructured Discontinuous Galerkin Method for Jet Noise Prediction**<br>R. Harris, CFD Research Corporation, Huntsville, AL; E. Collins, E. Luke, A. Sescu, Mississippi State University, Mississippi State, MS | |

| Tuesday, 5 January 2016 | | | | | | | |
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| 168-ABPSI-4 | Propulsion Integration | | | | | | Golden Hill B |
| Chaired by: D. BENCHERGUI, Bombardier Inc | | | | | | | |
| 1400 hrs<br>AIAA-2016-0763<br>**Investigation of the impact of a Variable Area Fan Nozzle on the overall performance of an UHBR-Highlift-Configuration**<br>S. Ritter, German Aerospace Center (DLR), Braunschweig, Germany | 1430 hrs<br>AIAA-2016-0764<br>**Aerodynamics of Aero-Engine Installation**<br>T. Stankowski, D. MacManus, Cranfield University, Cranfield, United Kingdom; C. Sheaf, N. Grech, Rolls-Royce Group plc, Derby, United Kingdom | 1500 hrs<br>AIAA-2016-0765<br>**Gas Temperature Measurement using FTIR Spectroscopy in Small Internal Combustion Engines**<br>M. Deutsch, J. Ausserer, M. Polanka, Air Force Institute of Technology, Wright-Patterson AFB, OH; P. Litke, A. Caswell, Air Force Research Laboratory, Wright-Patterson AFB, OH; K. Grinstead, Innovative Scientific Solutions, Inc., Dayton, OH | 1530 hrs<br>AIAA-2016-0766<br>**Aerodynamic Interference for Aero-Engine Installations**<br>T. Stankowski, D. MacManus, Cranfield University, Cranfield, United Kingdom; C. Sheaf, N. Grech, Rolls-Royce Group plc, Derby, United Kingdom | 1600 hrs<br>AIAA-2016-0767<br>**Progress in Optimizing the Propulsive Fuselage Aircraft Concept**<br>J. Bijewitz, A. Seitz, A. Isikveren, M. Hornung, Bauhaus Luftfahrt e.V., Ottobrunn, Germany | 1630 hrs<br>AIAA-2016-0768<br>**Experimental Performance of a Small Scale Pressure Wave Supercharger**<br>M. Mataczynski, Air Force Research Laboratory, Wright-Patterson AFB, OH; D. Paxson, NASA Glenn Research Center, Cleveland, OH; M. Polanka, Air Force Institute of Technology, Wright-Patterson AFB, OH; J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH | 1700 hrs<br>AIAA-2016-0769<br>**A Transient Aircraft/Jet-Engine Simulator for Education**<br>J. Dionisopoulos, M. Danilevsky, E. Kellogg, G. Christensen, D. Nguyen, R. Davis, University of California, Davis, Davis, CA |

| Tuesday, 5 January 2016 | | | | | | |
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| **169-ACD-2** | **Aircraft Design Issues II** | | | | | **Cortez Hill A** |
| Chaired by: R. BARRETT-GONZALEZ, The University of Kansas and J. MERRET, Gulfstream Aerospace Corporation | | | | | | |
| 1400 hrs<br>AIAA-2016-0770<br>**A Simple Method for High-Lift Propeller Conceptual Design**<br>M. Patterson, N. Borer, NASA Langley Research Center, Hampton, VA; B. German, Georgia Institute of Technology, Atlanta, GA | 1430 hrs<br>AIAA-2016-0771<br>**Engine/Inlet Matching for Supersonic Aircraft Design**<br>C. Dickman, T. Takahashi, Arizona State University, Tempe, AZ | 1500 hrs<br>AIAA-2016-0772<br>**Influence of Engine Intake/Exhaust on Wing Design of Civil Aircraft by Means of Knowledge Discovery Techniques**<br>N. Endo, M. Kanazaki, Tokyo Metropolitan University, Hino, Japan; M. Murayama, K. Yamamoto, Japan Aerospace Exploration Agency (JAXA), Mitaka, Japan | 1530 hrs<br>AIAA-2016-0773<br>**Variable Camber Application to Aircraft in Formation Flight**<br>Y. Liu, E. Stumpf, RWTH Aachen University, Aachen, Germany | 1600 hrs<br>AIAA-2016-0774<br>**Tracking PRSEUS Technical Progress with Reduction of Performance Uncertainty Through Technology Development and Demonstration Phases**<br>J. Corman, D. Mavris, Georgia Institute of Technology, Atlanta, GA | 1630 hrs<br>AIAA-2016-0775<br>**Aircraft Concepts Modeling with Subdivision Surfaces**<br>K. Amadori, C. Jouannet, Saab, Linköping, Sweden | |

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| **170-ACD-3** | **Aircraft Wing Design** | | | | | **Bankers Hill** |
| Chaired by: D. HALL, DHC Engineering and C. BIL, RMIT University | | | | | | |
| 1400 hrs<br>AIAA-2016-0776<br>**Aerodynamic Design of a Winglet for the Dassault Falcon 10**<br>N. El Haddad, L. Gonzalez-Linero, Embry-Riddle Aeronautical University, Daytona Beach, FL | 1430 hrs<br>AIAA-2016-0777<br>**A Novel Three Dimensional Aircraft Wing Design Method Using High Order Bezier Curves**<br>C. Im, Palos Verdes Peninsula High School, Rolling Hills Estates, CA | 1500 hrs<br>AIAA-2016-0778<br>**Aeroelastic Analysis of High Apect Ratio Wings**<br>A. Suleman, University of Victoria, Victoria, Canada; F. Afonso, Technical University of Lisbon, Lisbon, Portugal; C. Spada, Technical University of Turin, Turin, Italy | 1530 hrs<br>AIAA-2016-0779<br>**Aircraft High-Lift Aerodynamic Analysis Using a Surface-Vorticity Solver**<br>E. Olson, C. Albertson, NASA Langley Research Center, Hampton, VA | 1600 hrs<br>AIAA-2016-0780<br>**A Physics-Based Methodology for Cantilever and Strut-Braced Wing Weight Estimation**<br>D. Locatelli, B. Riggins, R. Kapania, J. Schetz, Virginia Polytechnic Institute and State University, Blacksburg, VA; T. Poquet, Snecma, Moissy-Cramayel, France | 1630 hrs<br>AIAA-2016-0781<br>**Wing Design Challenges Explained: A Study of the Finite Wing Effects of Camber, Thickness, and Twist**<br>J. Jensen, T. Takahashi, Arizona State University, Tempe, AZ | |

| Tuesday, 5 January 2016 | | | | | | |
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| **171-AFM-6** | **Launch Vehicle, Missile, and Projectile Flight Mechanics II** | | | | | **Cortez Hill B** |
| Chaired by: F. FRESCONI, US Army Research Lab and T. RICHARDSON, University of Bristol | | | | | | |
| 1400 hrs<br>AIAA-2016-0782<br>**Flight Behavior of an Asymmetric Body through Spark Range Experiments using Roll-Yaw Resonance for Yaw Enhancement**<br>F. Fresconi, B. Guidos, I. Celmins, Army Research Laboratory, Aberdeen Proving Ground, MD; W. Hathaway, Arrow Tech Associates, Burlington, VT | 1430 hrs<br>AIAA-2016-0783<br>**A Proposed Ascent Abort Flight Test for the Max Launch Abort System**<br>P. Tartabini, M. Gilbert, B. Starr, NASA Langley Research Center, Hampton, VA | 1500 hrs<br>AIAA-2016-0784<br>**Part-I : Aerodynamic Data Generation and 6 DOF Trajectory Calculation of a Baseline Large-Caliber Spinning Projectile**<br>J. Masud, F. Chughtai, Air University, Islamabad, Pakistan; S. Akhtar, National University of Sciences and Technology, Risalpur, Pakistan | 1530 hrs<br>AIAA-2016-0785<br>**Part-II : Effect of Design Modifications on Computed Trajectory of a Large-Caliber Spinning Projectile**<br>J. Masud, F. Chughtai, Air University, Islamabad, Pakistan; S. Akhtar, National University of Sciences and Technology, Risalpur, Pakistan | 1600 hrs<br>AIAA-2016-0786<br>**SHEFEX II - A First Aerodynamic and Atmospheric Post-Flight Analysis**<br>M. Franze, German Aerospace Center (DLR), Brunswick, Germany | 1630 hrs<br>AIAA-2016-0787<br>**Rapid Characterization of Munitions Using Neural Networks**<br>M. Carpenter, N. Speakman, R. Hartfield, Auburn University, Auburn, AL | |

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| 172-AMT-4 | Velocimetry II | | | | | Harbor D |
| Chaired by: K. LOWE and T. JENKINS, MetroLaser Inc | | | | | | |
| 1400 hrs<br>AIAA-2016-0788<br>**A Hybrid Technique for Laser Flare Reduction**<br>D. Cadel, D. Shin, K. Lowe, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1430 hrs<br>AIAA-2016-0789<br>**Comparison of Pulse-Burst PIV Data to Simultaneous Conventional PIV Data**<br>S. Beresh, J. Wagner, J. Henfling, R. Spillers, B. Pruett, Sandia National Laboratories, Albuquerque, NM | 1500 hrs<br>AIAA-2016-0790<br>**Three component LDV probe for AFRL-TGF for SWBLI Studies**<br>C. DeSio, University of Alabama, Tuscaloosa, Tuscaloosa, AL; K. Miller, Lockheed Martin Corporation, Manassas, VA; P. Schinetsky, N. Chaganti, B. Brooker, University of Alabama, Tuscaloosa, Tuscaloosa, AL; J. Tinapple, Air Force Research Laboratory, Wright-Patterson AFB, OH; et al. | 1530 hrs<br>AIAA-2016-0791<br>**Pulse-Burst PIV Measurements of Transient Phenomena in a Shock Tube**<br>J. Wagner, S. Beresh, E. Demauro, K. Casper, D. Guildenbecher, B. Pruett, Sandia National Laboratories, Albuquerque, NM; et al. | 1600 hrs<br>AIAA-2016-0792<br>**Three-Component Unseeded Velocity Diagnostic for Jet Engine Exhaust Flows**<br>T. Jenkins, C. Hess, MetroLaser, Inc., Laguna Hills, CA | 1630 hrs<br>AIAA-2016-0793<br>**Measurements of Gas-Phase Velocity during Shock-Particle Interactions using Pulse-Burst PIV**<br>E. Demauro, J. Wagner, S. Beresh, P. Farias, B. Pruett, Sandia National Laboratories, Albuquerque, NM | |

| Tuesday, 5 January 2016 | | | | | | |
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| 173-APA-16 | Special Session: Space Launch System (SLS) Induced Environments II | | | | | Coronado D |
| Chaired by: R. GOMEZ and J. PINIER, NASA Langley Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0794<br>**Global Comparison of CFD and Wind Tunnel Derived F&M Databases for the Space Launch System**<br>M. Hemsch, ViGYAN, Inc., Hampton, VA | 1430 hrs<br>AIAA-2016-0795<br>**Space Launch System Aerodynamic Database Uncertainty Quantification Methodologies**<br>A. Favaregh, H. Houlden, ViGYAN, Inc., Hampton, VA; J. Pinier, NASA Langley Research Center, Hampton, VA; M. Hemsch, ViGYAN, Inc., Hampton, VA | 1500 hrs<br>AIAA-2016-0796<br>**Space Launch System Booster Separation Aerodynamic Testing at the NASA Langley Unitary Plan Wind Tunnel**<br>F. Wilcox, J. Pinier, D. Chan, NASA Langley Research Center, Hampton, VA; W. Crosby, NASA Marshall Space Flight Center, Huntsville, AL | 1530 hrs<br>AIAA-2016-0797<br>**Inviscid and Viscous CFD Analysis of Booster Separation for the Space Launch System Vehicle**<br>D. Dalle, S. Rogers, H. Lee, W. Chan, NASA Ames Research Center, Moffett Field, CA | 1600 hrs<br>AIAA-2016-0798<br>**Space Launch System Booster Separation Aerodynamic Database Development and Uncertainty Quantification**<br>D. Chan, NASA Langley Research Center, Hampton, VA; D. Dalle, S. Rogers, NASA Ames Research Center, Moffett Field, CA; J. Pinier, F. Wilcox, NASA Langley Research Center, Hampton, VA; R. Gomez, NASA Johnson Space Center, Houston, TX | 1630 hrs<br>SLS Discussion | |

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| 174-APA-17 | Applied CFD & Numerical Correlations with Experimental Data II | | | | | Americas Cup B |
| Chaired by: M. PARK, NASA-Langley Research Center and M. FOSSATI, McGill University | | | | | | |
| 1400 hrs<br>AIAA-2016-0799<br>**Transonic Numerical and Experimental Investigation into Unconventional Lambda Wing Control Surfaces**<br>M. Paul, Air Force Research Laboratory, Kirtland AFB, NM; M. Rein, German Aerospace Center (DLR), Göttingen, Germany | 1430 hrs<br>AIAA-2016-0800<br>**Numerical and laboratory experiments on a new wing-body-tail configuration**<br>L. Smith, University of Pretoria, Pretoria, South Africa; T. Davis, G. Spedding, University of Southern California, Los Angeles, CA; J. Meyer, University of Pretoria, Pretoria, South Africa | 1500 hrs<br>AIAA-2016-0801<br>**An Experimental and Numerical Study on a Small-Scale Joined-Wing Aircraft**<br>Z. Teo, T. New, Nanyang Technological University, Singapore, Singapore; B. Nagel, V. Gollnick, German Aerospace Center (DLR), Hamburg, Germany | 1530 hrs<br>AIAA-2016-0802<br>**Computational and Experimental Investigation into Flapping Wing Propulsion**<br>H. Hoeijmakers, J. Mulder, University of Twente, Enschede, The Netherlands | 1600 hrs<br>AIAA-2016-0803<br>**CFD Predictions of Unsteady Aero-Loads from Vortex Shedding on A-320 Landing Gear Door**<br>M. Tomac, A. Rizzi, Royal Institute of Technology (KTH), Stockholm, Sweden | | |

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| **175-APA-18** | **Aerodynamic Design: Analysis, Methodologies, and Optimization Techniques III** | | | | | **Americas Cup C** |
| Chaired by: P. ANSELL, University of Illinois at Urbana-Champaign and K. DENISSEN, Sandia National Labs | | | | | | |
| 1400 hrs<br>AIAA-2016-0804<br>**Evaluation of Load Analysis Methods for NASA's GIII Adaptive Compliant Trailing Edge Project**<br>J. Cruz, E. Miller, NASA Armstrong Flight Research Center, Edwards, CA | 1430 hrs<br>AIAA-2016-0805<br>**Low Order Supersonic Nozzle Design using Superimposed Characteristics**<br>O. Jegede, W. Crowther, University of Manchester, Manchester, United Kingdom | 1500 hrs<br>AIAA-2016-0806<br>**Flight Dynamics Modeling of a Propeller-Driven Cargo Airplane**<br>K. Biber, Bartin University, Bartin, Turkey | 1530 hrs<br>AIAA-2016-0807<br>**Gradient based aerodynamic shape optimization using the FIVER embedded boundary method**<br>D. De Santis, M. Zahr, C. Farhat, Stanford University, Stanford, CA | 1600 hrs<br>AIAA-2016-0808<br>**Sensitivity and Stability Derivative Analysis using an Efficient Adjoint Harmonic Balance Technique**<br>A. Kaminsky, K. Ekici, University of Tennessee, Knoxville, Knoxville, TN | 1630 hrs<br>AIAA-2016-0809<br>**A Continuous Adjoint Method for Viscous Flows at All Speeds**<br>H. Lee, S. Lee, Inha University, Incheon, South Korea | 1700 hrs<br>AIAA-2016-0810<br>**Surrogate-based Robust Airfoil Optimization under Aleatory Flight Condition and Geometric Uncertainties**<br>L. Shi, Z. Han, M. Shahbaz, W. Song, Northwestern Polytechnical University, Xi'an, China |

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| **176-APA-20** | **Propeller/Rotorcraft/Wind Turbine Aerodynamics I** | | | | | **Americas Cup D** |
| Chaired by: J. RAULEDER, Technical University of Munich and M. CALVERT, U.S. Army AMRDEC | | | | | | |
| 1400 hrs<br>AIAA-2016-0811<br>**Implicit Hybrid mesh Method for the Computation of Rotorcraft Flows**<br>M. Woodgate, G. Barakos, University of Liverpool, Liverpool, United Kingdom | 1430 hrs<br>AIAA-2016-0812<br>**Computational Analysis of Multi-Rotor Flows**<br>S. Yoon, H. Lee, T. Pulliam, NASA Ames Research Center, Moffett Field, CA | 1500 hrs<br>AIAA-2016-0813<br>**Time Marching Simulations of Wind Turbine Blades Subject to Particle Erosion**<br>G. Fiore, M. Selig, University of Illinois, Urbana-Champaign, Urbana, IL | 1530 hrs<br>AIAA-2016-0814<br>**Structured Overlapping Grid Simulations of Contra-Rotating Open Rotor Noise**<br>J. Housman, C. Kiris, NASA Ames Research Center, Moffett Field, CA | 1600 hrs<br>AIAA-2016-0815<br>**Open Rotor Computational Aeroacoustic Analysis with an Immersed Boundary Method**<br>C. Brehm, Science and Technology Corporation, Moffett Field, CA; M. Barad, C. Kiris, NASA Ames Research Center, Moffett Field, CA | | |

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| **177-ASC-2** | **Modeling and Analysis** | | | | | **Gaslamp D** |
| Chaired by: O. BILGEN, Old Dominion University and J. KAUFFMAN, University of Central Florida | | | | | | |
| 1400 hrs<br>AIAA-2016-0816<br>**Design optimization of a morphing flap device using variable stiffness materials**<br>Q. Ai, P. Weaver, M. Azarpeyvand, University of Bristol, Bristol, United Kingdom | 1430 hrs<br>AIAA-2016-0817<br>**A Multistep Morphing Structures Design Approach Applied to Different Types of Applications in Aerospace**<br>L. da Rocha-Schmidt, L. Datashvili, H. Baier, Technical University of Munich, Garching, Germany | 1500 hrs<br>AIAA-2016-0818<br>**Induced Strain Actuation for Solid-State Ornithopters: A Geometric Configuration Study**<br>F. Hauris, O. Bilgen, Old Dominion University, Norfolk, VA | 1530 hrs<br>AIAA-2016-0819<br>**Design and Analysis of the Link Mechanism in the Flapping Wing MAV Using Flexible Multi-Body Dynamic Analysis**<br>J. Jeon, H. Cho, Y. Kim, J. Lee, S. Shin, C. Kim, Seoul National University, Seoul, South Korea ; et al. | 1600 hrs<br>AIAA-2016-0820<br>**Aero-electro-mechanical Coupling of Electro-Active Membrane Wings**<br>I. Barbu, R. de Kat, B. Ganapathisubramani, University of Southampton, Southampton, United Kingdom | 1630 hrs<br>AIAA-2016-0821<br>**Hybrid Position Feedback Control of Bistable Structures**<br>M. Simsek, O. Bilgen, Old Dominion University, Norfolk, VA | 1700 hrs<br>AIAA-2016-0822<br>**Multiscale modeling of electrical transport in carbon nanotube-metal-polymer composite materials.**<br>S. Shenogin, University of Dayton Research Institute, Dayton, OH; J. Lee, Universal Technology Corporation, Dayton, OH; A. Voevodin, A. Roy, Air Force Research Laboratory, Wright-Patterson AFB, OH |

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| **178-DE-2** | **Innovative Designs in Aerospace / Design Education** | | | | | **Old Town A** |
| Chaired by: J. CUTSHALL, Southwest Research Institute and J. WANG, Kingston University | | | | | | |
| 1400 hrs<br>AIAA-2016-0823<br>**Framework for Probabilistic Analysis of Future Energy Technologies: Hybrid-Electric Propulsion**<br>C. Justin, A. Ramamurthy, S. Briceno, D. Mavris, Georgia Institute of Technology, Atlanta, GA | 1430 hrs<br>AIAA-2016-0824<br>**Design of an Automated On-Demand Meal Delivery System Under Emerging and Evolving Passenger Requirements**<br>C. Frank, M. Deveraux, R. Ausseil, D. Mavris, Georgia Institute of Technology, Atlanta, GA | 1500 hrs<br>AIAA-2016-0825<br>**Extending Low-Cost Linux Computers for Education and Applications in Embedded Control and Robotics**<br>H. Briggs, ATA Engineering, Inc., San Diego, CA; J. Strawson, T. Bewley, University of California, San Diego, La Jolla, CA | 1530 hrs<br>AIAA-2016-0826<br>**A Beagle Bone Black Baed AHRS for Control of Small UAS and Small Sounding Rockets**<br>C. Hall, North Carolina State University, Raleigh, NC | 1600 hrs<br>AIAA-2016-0827<br>**AREND: A Sensor Aircraft to support Wildlife Rangers**<br>J. Koster, A. Buysse, University of Colorado, Boulder, Boulder, CO; L. Smith, J. Huyssen, University of Pretoria, Pretoria, South Africa; J. Hotchkiss, J. Malangoni, Metropolia University of Applied Sciences, Helsinki, Finland; et al. | | |

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| **179-FD-21** | **Bio-inspired Flows** | | | | | **Promenade B** |
| Chaired by: K. GRANLUND, North Carolina State University and H. DONG, University of Virginia | | | | | | |
| 1400 hrs<br>AIAA-2016-0828<br>**Effect of rotational phase on the flow topology and force production of a flapping flat-plate wing**<br>S. Krishna, Syracuse University, Syracuse, NY; K. Mulleners, Swiss Federal Institute of Technology, Lausanne, Switzerland; M. Green, Syracuse University, Syracuse, NY | 1430 hrs<br>AIAA-2016-0829<br>**Experimental Study of the Three-Dimensional Wake of a Trapezoidal Pitching Panel**<br>J. King, R. Kumar, M. Green, Syracuse University, Syracuse, NY | 1500 hrs<br>AIAA-2016-0830<br>**Wake Dynamics and Structure of a Heaving Flexible Foil Based on PIV Measurements**<br>F. Siala, A. Totpal, J. Liburdy, Oregon State University, Corvallis, OR | 1530 hrs<br>AIAA-2016-0831<br>**Theoretical Investigation of the Aerodynamics of Membrane MAV Wings with Cambered Frames**<br>A. Wrist, J. Hubner, University of Alabama, Tuscaloosa, Tuscaloosa, AL | | | |

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| **180-FD-22** | **CFD: Error Estimation and Mesh Adaptation** | | | | | **Pier** |
| Chaired by: K. FIDKOWSKI, University of Michigan and C. ROY, Virginia Tech | | | | | | |
| 1400 hrs<br>AIAA-2016-0832<br>**Continuous adjoint based error estimation and r-refinement for the active-flux method**<br>K. Ding, K. Fidkowski, P. Roe, University of Michigan, Ann Arbor, Ann Arbor, MI | 1430 hrs<br>AIAA-2016-0833<br>**Development of a High-Order Space-Time Matrix-Free Adjoint Solver**<br>M. Ceze, L. Diosady, S. Murman, NASA Ames Research Center, Moffett Field, CA | 1500 hrs<br>AIAA-2016-0834<br>**A Truncation Error Based Mesh Adaption Metric for CFD**<br>T. Phillips, C. Ollivier Gooch, University of British Columbia, Vancouver, Canada | 1530 hrs<br>AIAA-2016-0835<br>**A Local Sampling Approach to Anisotropic Metric-Based Mesh Optimization**<br>K. Fidkowski, University of Michigan, Ann Arbor, Ann Arbor, MI | 1600 hrs<br>AIAA-2016-0836<br>**Discretization Error Estimation by the Error Transport Equation on Unstructured Meshes - Applications to Viscous Flows**<br>G. Yan, C. Ollivier Gooch, University of British Columbia, Vancouver, Canada | 1630 hrs<br>AIAA-2016-0837<br>**Entropy residual as an adaptation indicator for simulations of unsteady ows**<br>Y. Lv, M. Ihme, Stanford University, Stanford, CA | 1700 hrs<br>AIAA-2016-0838<br>**Robust moving-mesh algorithms for hybrid stretched meshes: Application to moving boundaries problems**<br>J. Landry, A. Soulaïmani, University of Québec, Montréal, Canada; E. Luke , Mississippi State University, Starkville, MS; A. Ben Haj Ali, Bombardier Aerospace, Montréal, Canada |

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| **181-FD-23/PDL-6** | **DBD Plasma Actuators II** | | | | | **Harbor F** |
| Chaired by: M. SAMIMY, The Ohio State University and J. ROVEY, Missouri University of Science & Technology | | | | | | |
| 1400 hrs<br>AIAA-2016-0839<br>**Control of Boundary Layer Separation and the Wake of an Airfoil using ns-DBD Plasma Actuators**<br>T. Ashcraft, K. Decker, J. Little, University of Arizona, Tucson, Tucson, AZ | 1430 hrs<br>AIAA-2016-0840<br>**Improving the Performance of a DBD Plasma Actuator Model through Modification of Boundary Condition Parameters**<br>J. Laten, R. LeBeau, Saint Louis University, St. Louis, MO | 1500 hrs<br>AIAA-2016-0841<br>**Control of a Non-Resonating Supersonic Cavity Using Plasma Actuators**<br>N. Webb, M. Samimy, Ohio State University, Columbus, OH | 1530 hrs<br>AIAA-2016-0842<br>**Laminar-Separation-Bubbles Flow Control over Airfoil Using SDBD Plasma Actuator**<br>M. Li, X. Meng, H. Li, F. Liu, S. Luo, Northwestern Polytechnical University, Xi'an, China | 1600 hrs<br>AIAA-2016-0843<br>**Flow Separation Control over a Boeing Vertol VR-7 using NS-DBD Plasma Actuators**<br>A. Esfahani, A. Singhal, C. Clifford, M. Samimy, Ohio State University, Columbus, OH | 1630 hrs<br>AIAA-2016-0844<br>**Experimental Study of Effects of Frequency for Burst Wave on a DBD Plasma Actuator for Separation**<br>S. Sekimoto, University of Tokyo, Sagamihara, Japan; T. Nonomura, K. Fujii, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan | 1700 hrs<br>AIAA-2016-0845<br>**The Phenomenology and Physics of Peristaltic Flow Acceleration Induced by Multiple DBD Plasma Actuators Based on PIV**<br>L. Feng, C. Gao, Z. Lv, B. Wu, L. Wu, Northwestern Polytechnical University, Xi'an, China |

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| **182-FD-24** | **Stability and Transition of Hypersonic Flows II** | | | | | **Promenade A** |
| Chaired by: H. REED, Texas A&M University and M. CHOUDHARI, NASA-Langley Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0846<br>**Numerical Investigation of Laminar-Turbulent Transition for a Flared Cone at Mach 6**<br>J. Sivasubramanian, H. Fasel, University of Arizona, Tucson, Tucson, AZ | 1430 hrs<br>AIAA-2016-0847<br>**Transition Prediction in Hypersonic Boundary Layers Using Receptivity and Freestream Spectra**<br>P. Balakumar, A. Chou, NASA Langley Research Center, Hampton, VA | 1500 hrs<br>AIAA-2016-0848<br>**Secondary Instability Analysis of Crossflow on a Hypersonic Yawed Straight Circular Cone**<br>A. Moyes, Texas A&M University, College Station, TX; P. Paredes, NASA Langley Research Center, Hampton, VA; T. Kocian, H. Reed, Texas A&M University, College Station, TX | 1530 hrs<br>AIAA-2016-0849<br>**Gortler Modified Mack-modes on a Hypersonic Flared Cone**<br>J. Kuehl, Baylor University, Waco, TX; P. Paredes, Technical University of Madrid, Madrid, Spain | 1600 hrs<br>AIAA-2016-0850<br>**Stabilization of the Hypersonic Boundary Layer by Finite-Amplitude Streaks**<br>J. Ren, S. Fu, Beijing Institute of Technology, Beijing, China; A. Hanifi, Royal Institute of Technology (KTH), Stockholm, Sweden | | |

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| **183-FD-25** | **Wing Aerodynamics** | | | | | **Cove** |
| Chaired by: R. AGARWAL, Washington University in St Louis and R. CUMMINGS, US Air Force Academy | | | | | | |
| 1400 hrs<br>AIAA-2016-0851<br>**Drag, Lift and Effective Angle of Attack from the Wake of an Airfoil in the Open-Jet Wind Tunnel**<br>D. Faleiros, University of Twente, Enschede, The Netherlands ; M. Tuinstra, National Aerospace Laboratory (NLR), Marknesse, The Netherlands ; H. Hoeijmakers, University of Twente, Enschede, The Netherlands | 1430 hrs<br>AIAA-2016-0852<br>**Experimental investigation of the wake of a lifting wing with cut-in sinusoidal trailing edges**<br>S. Prigent, O. Buxton, P. Bruce, Imperial College London, London, United Kingdom | 1500 hrs<br>AIAA-2016-0853<br>**Effect of the leading and trailing edge geometry on the fluid-structural coupling of membrane aerofoils**<br>S. Serrano Galiano, R. Sandberg, University of Southampton, Southampton, United Kingdom | 1530 hrs<br>AIAA-2016-0854<br>**Experimental Study of Thin and Thick Airfoils at Low Reynolds Numbers**<br>E. Garcia, P. Yu, V. Durgesh, H. Johari, California State University, Northridge, CA | 1600 hrs<br>AIAA-2016-0855<br>**Steady Aerodynamics of Thick and Cambered Airfoils with Porosity Gradients**<br>R. Hajian, J. Jaworski, Lehigh University, Bethlehem, PA | 1630 hrs<br>AIAA-2016-0856<br>**Flow Physics of a Multi-Element Airfoil in Ground Effect**<br>Q. Qu, B. Ju, L. Huang, P. Liu, Beihang University, Beijing, China; R. Agarwal, Washington University in St. Louis, St. Louis, MO | 1700 hrs<br>AIAA-2016-0857<br>**The effect of aspect ratio on the near-wake flow of rectangular wings**<br>A. DeVoria, K. Mohseni, University of Florida, Gainesville, Gainesville, FL |

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| **184-FD-26/APA-21** | **Special Session: Evaluation of RANS Solvers on Benchmark Aerodynamic Flows I** | | | | | **Harbor E** |
| Chaired by: B. DISKIN, National Institute of Aerospace and H. LUO, North Carolina State University | | | | | | |
| 1400 hrs<br>AIAA-2016-0858<br>**Grid-Converged Reynolds Averaged Navier Stokes Solutions for Benchmark Three-Dimensional Cases (Invited)**<br>B. Diskin, National Institute of Aerospace, Hampton, VA; J. Thomas, C. Rumsey, M. Pandya, NASA Langley Research Center, Hampton, VA | 1430 hrs<br>AIAA-2016-0859<br>**Spatial Convergence of Three Dimensional Turbulent Flows**<br>M. Park, W. Anderson, NASA Langley Research Center, Hampton, VA | 1500 hrs<br>AIAA-2016-0860<br>**Assessment of Preconditioner for a USM3D Hierarchical Adaptive Nonlinear Iteration Method (HANIM) (Invited)**<br>M. Pandya, NASA Langley Research Center, Hampton, VA; B. Diskin, National Institute of Aerospace, Hampton, VA; J. Thomas, N. Frink, NASA Langley Research Center, Hampton, VA | 1530 hrs<br>AIAA-2016-0861<br>**High-Order Discontinuous Galerkin Mesh Resolved Turbulent Flow Simulations of NASA Turbulence Model Validation Cases**<br>M. Brazell, D. Mavriplis, University of Wyoming, Laramie, Laramie, WY | 1600 hrs<br>AIAA-2016-0862<br>**High-Order Output-Based Adaptive Simulations of Turbulent Flow in Three Dimensions (Invited)**<br>K. Fidkowski, University of Michigan, Ann Arbor, Ann Arbor, MI; M. Ceze, NASA Ames Research Center, Moffett Field, CA | | |

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| **185-GEPC-3** | **Noise Reduction and Flight Demonstrations** | | | | | **Americas Cup A** |
| Chaired by: N. MADAVAN, NASA-Ames Research Center and G. BEZOS O'CONNOR, NASA-Langley Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0863<br>**Assessment of the Noise Reduction Potential of Advanced Subsonic Transport Concepts for NASA's Environmentally Responsible Aviation Project**<br>R. Thomas, C. Burley, C. Nickol, NASA Langley Research Center, Hampton, VA | 1430 hrs<br>AIAA-2016-0864<br>**Innovative Flow Control Concepts for Drag Reduction**<br>J. Lin, NASA Langley Research Center, Hampton, VA; E. Whalen, The Boeing Company, Hazelwood, MO; J. Eppink, E. Siochi, M. Alexander, M. Andino, NASA Langley Research Center, Hampton, VA | 1500 hrs<br>Oral Presentation<br>**Challenges with Developmenting a Distributed Electric Propulsion Researach Aircraft**<br>S. Ginn, D. Hines, S. Clarke, M. Redifer, NASA Armstrong Flight Research Center, Edwards, CA | 1530 hrs<br>AIAA-2016-0865<br>**Green Aerospace Engineering: A Focus on the Technical and Economical Hurdles of Next Generation Lithium-Ion Batteries**<br>A. Gohardani, R. Dunn, N. Millecam, Infineon Technologies AG, Irvine, CA | 1600 hrs<br>AIAA-2016-0866<br>**Entropy Generation Minimisation and Exergy analysis approaches for aerospace applications - A review**<br>D. Hayes, M. Lone, J. Whidborne, Cranfield University, Cranfield, United Kingdom; E. Coetzee, Airbus, Bristol, United Kingdom | | |

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| **186-GNC-16** | **Optimal Control: Methods and Applications** | | | | | **Hillcrest A** |
| Chaired by: H. LIU, University of Toronto and A. AWAD | | | | | | |
| 1400 hrs<br>AIAA-2016-0867<br>**Exact Hybrid Jacobian Computation for Optimal Trajectories via Dual Number Theory**<br>V. D'Onofrio, University of Naples "Federico II", Naples, Italy; M. Sagliano, Y. Arslantas, German Aerospace Center (DLR), Bremen, Germany | 1430 hrs<br>AIAA-2016-0868<br>**Analytical Solution for Optimal Drogue-to-Main Parachute Transition Altitude for Ballistic Airdrops**<br>A. Gerlach, Universal Technology Corporation, Dayton, OH; D. Doman, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1500 hrs<br>AIAA-2016-0869<br>**Approximate Model Predictive Control for Polynomial Systems Using Sum-of-Squares Programming**<br>N. Yokoyama, National Defense Academy, Yokosuka, Japan | 1530 hrs<br>AIAA-2016-0870<br>**Longitudinal trajectory optimization of an underwater glider in finite depth water**<br>S. Yoon, J. Kim, Korea Advanced Institute of Science and Technology, Daejeon, South Korea | 1600 hrs<br>AIAA-2016-0871<br>**Monte Rey Methods for Unscented Optimization**<br>I. Ross, R. Proulx, M. Karpenko, Naval Postgraduate School, Monterey, CA | | |

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| **187-GNC-17** | **Spacecraft Formations and Rendezvous** | | | | | **Hillcrest B** |
| Chaired by: J. THIENEL, NASA Goddard Space Flight Center and I. GRAVSETH | | | | | | |
| 1400 hrs<br>AIAA-2016-0872<br>**An Information-Theoretic Active Localization Approach during Relative Circumnavigation in Orbit**<br>M. Kontitsis, P. Tsiotras, E. Theodorou, Georgia Institute of Technology, Atlanta, GA | 1430 hrs<br>AIAA-2016-0873<br>**Game Theoretic Strategies for Spacecraft Rendezvous and Motion Synchronization**<br>M. Innocenti, V. Tartaglia, University of Pisa, Pisa, Italy | 1500 hrs<br>AIAA-2016-0874<br>**Spacecraft Formation Keeping via Discrete-Time Hamilton-Jacobi Theory**<br>K. Lee, C. Park, Yonsei University, Seoul, South Korea ; T. Lee, George Washington University, Washington, D.C.; S. Park, Yonsei University, Seoul, South Korea | 1530 hrs<br>AIAA-2016-0875<br>**Pose Tracking of a Noncooperative Spacecraft During Docking Maneuvers Using a Time-of-Flight Sensor**<br>J. Ventura, A. Fleischner, U. Walter, Technical University of Munich, Munich, Germany | 1600 hrs<br>AIAA-2016-0876<br>**An Inverse Dynamics-Based Trajectory Planner for Autonomous Docking to a Tumbling Target**<br>J. Ventura, Technical University of Munich, Munich, Germany; M. Ciarcia, M. Romano, Naval Postgraduate School, Monterey, CA; U. Walter, Technical University of Munich, Munich, Germany | 1630 hrs<br>AIAA-2016-0877<br>**Analytical Formulation for Light and Fast Low-Thrust Guidance Design to Perform Multi-Target On-Orbit Servicing**<br>L. Bucci, M. Lavagna, Technical University of Milan, Milan, Italy | |

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| **188-GNC-18** | **Invited Session: LOC-4, Onboard Systems for LOC Prevention and Recovery – Upset Recovery and System Validation** | | | | | **Coronado B** |
| Chaired by: D. CRIDER, National Transportation Safety Board and C. BELCASTRO, NASA-Langley Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0878<br>**Stall Recovery Guidance Algorithms Based on Constrained Control Approaches**<br>V. Stepanyan, University of California, Santa Cruz, Santa Cruz, CA; K. Krishnakumar, J. Kaneshige, D. Acosta, NASA Ames Research Center, Moffett Field, CA | 1430 hrs<br>AIAA-2016-0879<br>**Development and Pilot-In-The-Loop Evaluation of Robust Upset-Recovery Guidance**<br>N. Richards, N. Gandhi, A. Bateman, Barron Associates, Inc., Charlottesville, VA; D. Klyde, A. Lampton, Systems Technology, Inc., Hawthorne, CA | 1500 hrs<br>AIAA-2016-0880<br>**Aircraft Trim Recovery from Highly Nonlinear Upset Conditions**<br>B. Chang, H. Kwatny, E. Ballouz, D. Hartman, Drexel University, Philadelphia, PA | 1530 hrs<br>AIAA-2016-0881<br>**Real-Time Extended Kalman Filter Stability Indicator**<br>K. Lassak, Y. Gu, West Virginia University, Morgantown, WV | 1600 hrs<br>AIAA-2016-0882<br>**AirSTAR Beyond Visual Range System Description and Preliminary Test Results**<br>K. Cunningham, D. Cox, J. Foster, S. Riddick, S. Laughter, NASA Langley Research Center, Hampton, VA | | |

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| **189-GNC-19** | **Aerospace Robotics and Unmanned/Autonomous Systems IV** | | | | | **Hillcrest C** |
| Chaired by: T. BOGE, DLR GSOC and M. AKELLA, University of Texas at Austin | | | | | | |
| 1400 hrs<br>AIAA-2016-0883<br>**Integral Vector Field Path Following for a Stratospheric Satellite**<br>T. Chen, Z. Zewei, M. Zhu, Z. Wu, Beihang University, Beijing, China | 1430 hrs<br>AIAA-2016-0884<br>**Control Laws Development for a Free-Flying Unmanned Robotic System to Support Interplanetary Bodies Prospecting and Characterization Missions.**<br>A. Perez Rocha, H. Moncayo, R. Prazenica, Embry-Riddle Aeronautical University, Daytona Beach, FL; K. Zacny, Honeybee Robotics, Pasadena, CA; R. Mueller, M. Dupuis, NASA Kennedy Space Center, Cape Canaveral, FL; et al. | 1500 hrs<br>AIAA-2016-0885<br>**Trajectory Optimization of Space Manipulator with Non-zero Angular Momentum During Orbital Capture Maneuver**<br>T. Rybus, K. Seweryn, Space Research Centre of the Polish Academy of Sciences (CBK PAN), Warsaw, Poland; J. Sasiadek, Carleton University, Ottawa, Canada | 1530 hrs<br>AIAA-2016-0886<br>**Autonomous Determination of Spin Rate and Rotation Axis of Rocket Bodies based on Point Clouds**<br>H. Gomez Martinez, B. Eissfeller, University of the German Federal Armed Forces, Neubiberg, Germany | 1600 hrs<br>AIAA-2016-0887<br>**Autonomous Navigation of a Balloon over Saturn's Moon Titan**<br>K. Garg, E. Mooij, Delft University of Technology, Delft, The Netherlands | 1630 hrs<br>AIAA-2016-0888<br>**Vision-Aided Navigation for a Free-Flying Unmanned Robotic System to Support Interplanetary Bodies Prospecting and Characterization Missions**<br>R. Prazenica, Z. Kern, T. John, H. Moncayo, Embry-Riddle Aeronautical University, Daytona Beach, FL; K. Zacny, Honeybee Robotics, Pasadena, CA; R. Mueller, NASA Kennedy Space Center, Cape Canaveral, FL; et al. | 1700 hrs<br>AIAA-2016-0889<br>**Trajectory Optimization for Proximity Operations Around Tumbling Geometrical Constraints via Legendre Polynomials**<br>J. Shi, S. Ulrich, Carleton University, Ottawa, Canada; A. Allen, MacDonald, Dettwiler and Associates, Ltd., Brampton, Canada |

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| **190-GNC-20** | **Control of Bio-inspired Mini/Micro UAVs** | | | | | **Hillcrest D** |
| Chaired by: H. TAHA, University of California, Irvine and L. SINGH, The Charles Stark Draper Laboratory, Inc. | | | | | | |
| 1400 hrs<br>AIAA-2016-0890<br>**A Combined Geometric-Control-Averaging to Optimum Trim of Hovering FWMAVs and Insects**<br>H. Taha, University of California, Irvine, Irvine, CA; D. Allen, S. Tahmasian, C. Woolsey, M. Hajj, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1430 hrs<br>AIAA-2016-0891<br>**A Fuzzy Control Strategy for UAV Perching using Varying Tau-dot**<br>W. Chi, K. Low, K. Hoon, Nanyang Technological University, Singapore, Singapore | 1500 hrs<br>AIAA-2016-0892<br>**Kinematic Selection for a Tailless Flapping Wing Micro-Air Vehicle**<br>I. Weintraub, Air Force Research Laboratory, Wright-Patterson AFB, OH; D. Sigthorsson, InfoSciTech, Wright-Patterson AFB, OH; M. Oppenheimer, D. Doman, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1530 hrs<br>AIAA-2016-0893<br>**Transient Dynamic Analysis and Control of a Morphing UAV**<br>N. Prabhakar, R. Prazenica, S. Gudmundsson, M. Balas, Embry-Riddle Aeronautical University, Daytona Beach, FL | 1600 hrs<br>AIAA-2016-0894<br>**$L_1$ Adaptive Control for a Single Coaxial Rotor MAV**<br>M. Harada, R. Ichikawa, S. Watanabe, National Defense Academy, Yokosuka, Japan; K. Bollino, Naval Postgraduate School, Monterey, CA | 1630 hrs<br>AIAA-2016-0895<br>**Optimal UAV Rendezvous on a UGV**<br>A. Rucco, P. Sujit, A. Aguiar, J. Sousa, University of Porto, Porto, Portugal | |

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| **191-GT-4** | **Integration of Experimental and Computational Methods (Invited)** | | | | | **Harbor H** |
| Chaired by: S. DUNN, Jacobs Technology and V. CANACCI, Jacobs Technology | | | | | | |
| 1400 hrs<br>AIAA-2016-0896<br>**Direction and Integration of EFD and CFD, a Summary of Two Panel Sessions**<br>S. Dunn, NASA Langley Research Center, Hampton, VA | 1430 hrs<br>Oral Presentation<br>**Education and Training of the Next Generation of Aerospace Engineers**<br>R. Kumar, Florida State University, Tallahassee, FL | 1500 hrs<br>Oral Presentation<br>**Modeling and Simulation for Research**<br>A. Washburn, NASA Langley Research Center, Hampton, VA | 1530 hrs<br>AIAA-2016-0897<br>**The Air Force Digital Thread/ Digital Twin - Life Cycle Integration and Use of Computational and Experimental Knowledge.**<br>E. Kraft, Arnold Engineering Development Center, Arnold AFB, TN | 1600 hrs<br>Oral Presentation<br>**Developing a Briefing Targeted for Non-Engineers: The Role and Importance of Experimental and Computational Capabilities in the Development of New Aerospace Products.**<br>S. Dunn, Jacobs, Hampton, VA; V. Canacci, Jacobs, Cleveland, OH | | |

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| **192-GTE-6** | **Gas Turbine Engine with Pressure Gain Combustion** | | | | | **Harbor C** |
| Chaired by: G. MEHOLIC, The Aerospace Corporation and S. HEISTER, Purdue University | | | | | | |
| 1400 hrs<br>AIAA-2016-0898<br>**Mono-dimensional analysis of the MagnetoHydrodynamic effect in Rotating Detonation Combustors**<br>J. Braun, B. Saracoglu, T. Magin, von Kármán Institute for Fluid Dynamics, Rhode-Saint-Genèse, Belgium; G. Paniagua, Purdue University, West Lafayette, IN | 1430 hrs<br>AIAA-2016-0899<br>**Design of an Actively Valved and Acoustically Resonant Pulse Combustor for Pressure-gain Combustion Applications**<br>J. Lisanti, W. Roberts, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia | 1500 hrs<br>AIAA-2016-0900<br>**Computationally Quantifying Loss Mechanisms in a Rotating Detonation Engine**<br>P. Strakey, D. Ferguson, A. Sisler, National Energy Technology Laboratory, Morgantown, WV; A. Nix, West Virginia University, Morgantown, WV | 1530 hrs<br>AIAA-2016-0901<br>**The Design of a Small-Scale Wave Rotor for Use As a Modified Brayton-Cycle Engine**<br>M. McClearn, M. Polanka, Air Force Institute of Technology, Wright-Patterson AFB, OH; M. Mataczynski, F. Schauer, Air Force Research Laboratory, Wright-Patterson AFB, OH; D. Paxson, NASA Glenn Research Center, Cleveland, OH | 1600 hrs<br>AIAA-2016-0902<br>**Development of a Three-dimensional Transient Wall Heat Transfer Model of a Rotating Detonation Combustor**<br>A. Roy, P. Strakey, T. Sidwell, D. Ferguson, National Energy Technology Laboratory, Morgantown, WV; A. Sisler, A. Nix, West Virginia University, Morgantown, WV | 1630 hrs<br>AIAA-2016-0903<br>**Testing and Characterization of a Liquid Hydrocarbon Fueled Rotating Detonation Engine**<br>J. Shepard, M. Polanka, Air Force Institute of Technology, Wright-Patterson AFB, OH; A. Naples, Innovative Scientific Solutions, Inc., Dayton, OH; F. Schauer, Air Force Research Laboratory, Wright-Patterson AFB, OH | |

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| **193-GTE-7** | **Turbine Cooling II** | | | | | **Harbor B** |
| Chaired by: A. NIX and R. ANTHONY | | | | | | |
| 1400 hrs<br>AIAA-2016-0904<br>**Film Coolant Property Variation in Scaling Gas Turbine Cooling Effectiveness**<br>C. Wiese, J. Rutledge, M. Polanka, R. Ashby, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1430 hrs<br>AIAA-2016-0905<br>**Jet Diameter Effect on Impingement Jet Cooling on the Leading Edge of a Turbine Blade**<br>S. Haider, X. Yan, Southern Illinois University, Edwardsville, IL | 1500 hrs<br>AIAA-2016-0906<br>**Spatial Concentration Fields and Trajectory Investigation of Single Row Film Cooling at Various Inclination Angles and Blowing Ratios Using Laser Induced Fluorescence**<br>M. Geikie, J. Sosa, C. Fernandes, K. Ahmed, J. Kapat, University of Central Florida, Orlando, FL | 1530 hrs<br>AIAA-2016-0907<br>**An Experimental Investigation of Shroud Cooling Using an Upstream Slot and Angled Discrete Holes**<br>S. Acharya, University of Memphis, Memphis, TN; O. Tamunobere, Louisiana State University, Baton Rouge, LA | 1600 hrs<br>AIAA-2016-0908<br>**Effect of Inlet Flow Condition on Heat Transfer in Pin-Fin Cooling Configurations**<br>S. Singh, Louisiana State University, Baton Rouge, LA; S. Acharya, University of Memphis, Memphis, TN; F. Ames, University of North Dakota, Fargo, Fargo, ND | 1630 hrs<br>AIAA-2016-0909<br>**Study of the attainable flow topologies in a supersonic blunt trailing edge at various blowing ratios**<br>Y. Gorbachova, E. Valero, Technical University of Madrid, Madrid, Spain; G. Paniagua, Purdue University, West Lafayette, IN; A. Martinez-Cava, Airbus, Filton, United Kingdom; B. Saracoglu, von Kármán Institute for Fluid Dynamics, Rhode-Saint-Genèse, Belgium | 1700 hrs<br>AIAA-2016-0910<br>**Wind Tunnel Testing of Turbine Blade Tip Flows**<br>S. Lavagnoli, C. De Maesschalck, V. Andreoli, von Kármán Institute for Fluid Dynamics, Rhode-Saint-Genèse, Belgium; G. Paniagua, D. Cuadrado, Purdue University, West Lafayette, IN |

| Tuesday, 5 January 2016 | | | | | | |
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| **194-HSABP-3** | **Scramjet Performance and Optimization** | | | | | **Regatta A** |
| Chaired by: F. MALO-MOLINA, Raytheon Missile Systems and R. SPRINGER, The Johns Hopkins University Applied Physics Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-0911<br>**Reduced Edney Type-IV Cowl Shock-On-Lip Heating By Leading Edge Geometry Optimization**<br>P. Rodi, Lockheed Martin Corporation, Houston, TX | 1430 hrs<br>AIAA-2016-0912<br>**Mulit-Objective Optimization of a Hypersonic Inlet Using Generalized Outflow Boundary Conditions in the Continuous Adjoint Method**<br>H. Kline, T. Economon, J. Alonso, Stanford University, Stanford, CA | 1500 hrs<br>AIAA-2016-0913<br>**The Design of Scramjet Engine Configurations for Optimal Operational Temperature and Overall Engine Efficiency**<br>F. Ferguson, N. Dasque, M. Dhanasar, North Carolina A&T State University, Greensboro, NC; I. Blankson, NASA Glenn Research Center, Cleveland, OH | 1530 hrs<br>AIAA-2016-0914<br>**A Method to Compute Flameout Limits of Scramjet-Powered Hypersonic Vehicles**<br>C. Mbagwu, J. Driscoll, University of Michigan, Ann Arbor, Ann Arbor, MI | 1600 hrs<br>AIAA-2016-0915<br>**Parametric Geometry Models for Hypersonic Aircraft: Integrated External Inlet Compression**<br>K. Kontogiannis, University of Southampton, Southampton, United Kingdom; N. Taylor, MBDA, Filton, United Kingdom; A. Sobester, University of Southampton, Southampton, United Kingdom | | |

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| **195-ICC-2** | **Information and Command and Control Systems** | | | | | **Regatta B** |
| Chaired by: M. SOTAK and J. MCEVER, The Johns Hopkins University Applied Physics Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-0916<br>**An Unknown-Input-Observer Based Approach for Cyber Attack Detection in Formation Flying UAVs**<br>L. Lemma, S. Kim, H. Choi, Korea Advanced Institute of Science and Technology, Daejeon, South Korea | 1430 hrs<br>AIAA-2016-0917<br>**LTL Templates for Play-Calling Supervisory Control**<br>T. Apker, Naval Research Laboratory, Washington, D.C.; B. Johnson, National Research Council, Washington, D.C.; L. Humphrey, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1500 hrs<br>AIAA-2016-0918<br>**Consensus Based Operating Picture for Distributed Battlefield Management**<br>K. Neema, Purdue University, West Lafayette, IN; S. Tamaskar, Cummins, Inc., Columbus, IN; D. DeLaurentis, Purdue University, West Lafayette, IN | 1530 hrs<br>AIAA-2016-0919<br>**Wildlife Tracking on the Wing Using Unmanned Air Systems**<br>S. Tavakoli, A. Heaton, University of Central Lancashire, Preston, United Kingdom | | | |

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| **196-IS-5** | **Novel Aerospace Applications of Intelligent Systems** | | | | | **Regatta C** |
| Chaired by: C. BOWMAN and C. IPPOLITO, NASA Ames Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0920<br>**Helicopter Cockpit Video Data Analysis for Attitude Estimation using DBSCAN Clustering**<br>S. Shin, I. Hwang, Purdue University, West Lafayette, IN | 1430 hrs<br>AIAA-2016-0921<br>**Intelligent Decentralized Unmanned Aerial Survey of Volcanic Plumes**<br>C. Ippolito, NASA Ames Research Center, Moffett Field, CA; D. Pieri, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; M. Fladeland, NASA Ames Research Center, Moffett Field, CA; J. Lohn, J. Dolan, Carnegie Mellon University, Pittsburgh, PA | 1500 hrs<br>AIAA-2016-0922<br>**Generic Clustering Approach to Track-to-Track Correlation for Multisensor-Multitarget Environments**<br>N. Hanlon, E. Kivelevitch, M. Kumar, K. Cohen, University of Cincinnati, Cincinnati, OH | 1530 hrs<br>AIAA-2016-0923<br>**Challenges and Opportunities in Flight Data Mining: A Review of the State of the Art**<br>A. Gavrilovski, H. Jimenez, D. Mavris, Georgia Institute of Technology, Atlanta, GA; A. Rao, S. Shin, I. Hwang, Purdue University, West Lafayette, IN; et al. | 1600 hrs<br>AIAA-2016-0924<br>**The Search for Signatures of Space Weather Effects**<br>C. Bowman, Data Fusion & Neural Networks, LLC, Broomfield, CO | | |

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| **197-LEC-5**<br>**1400 - 1500 hrs** | **DSC Lecture** | **Harbor A** |
| *The Curiosity/Mars Science Laboratory Sky-Crane Landing System*<br>**Jeffrey Umland**<br>Engineering Fellow<br>Jet Propulsion Laboratory | | |

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| **198-MAT-5** | **Fatigue & Fracture II** | | | | | **Gaslamp B** |
| Chaired by: R. FERTIG, University of Wyoming and J. DUSTIN, GE-Aviation | | | | | | |
| 1400 hrs<br>AIAA-2016-0925<br>**Improved Pre-Strain Method for Generating Goodman Data with Vibration-Based Fatigue Testing**<br>K. Knapp, Air Force Institute of Technology, Wright-Patterson AFB, OH; O. Scott-Emuakpor, T. George, C. Holycross, Air Force Research Laboratory, Wright-Patterson AFB, OH; A. Palazotto, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1430 hrs<br>AIAA-2016-0926<br>**Experimental, numerical, and analytical free vibration analyses of open-hole composite plates**<br>B. Aidi, Virginia Polytechnic Institute and State University, Blacksburg, VA; M. Shaat, A. Abdelkefi, New Mexico State University, Las Cruces, NM; S. Case, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1500 hrs<br>AIAA-2016-0927<br>**A Micromechanical Approach to High Cycle Fatigue Analysis and Life Prediction of Heterogeneous Materials**<br>H. Sertse, W. Yu, Purdue University, West Lafayette, IN | 1530 hrs<br>AIAA-2016-0928<br>**A novel crack growth equation based on crack tip opening displacement variation**<br>S. Jiang, W. Zhang, Z. Wang, Beihang University, Beijing, China | 1600 hrs<br>AIAA-2016-0929<br>**Anisotropic Fatigue Crack Growth in High-Strength Aluminium Alloys**<br>S. Van Der Veen, Airbus, Toulouse, France; H. Dijkers, R. Alderliesten, Delft University of Technology, Delft, The Netherlands | 1630 hrs<br>AIAA-2016-0930<br>**An equivalent crack growth model for creep fatigue life prediction of metals**<br>D. Pan, F. Tahir, Y. Liu, Arizona State University, Tempe, AZ | |

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| **199-MAT-6** | **Nanostructured Materials II** | | | | | | **Gaslamp C** |
| Chaired by: G. ODEGARD and B. WARDLE, Massachusettes Institute of Technology | | | | | | | |
| 1400 hrs<br>AIAA-2016-0931<br>**Effect of Combining Suspended Particle Shapes on Shear Thickening Fluid Behavior**<br>C. Kabanda Mihigo, T. Lacy, S. Kundu, C. Pittman , H. Toghiani, J. Warren, Mississippi State University, Starkville, MS | 1430 hrs<br>AIAA-2016-0932<br>**Effect of Amount of Nylon-66 Nanofiber Interleaf on Impact Performance of AS4/3501-6 Carbon Epoxy Composite Laminate**<br>H. Ahmed, K. Shivakumar, North Carolina A&T State University, Greensboro, NC | 1500 hrs<br>AIAA-2016-0933<br>**Grains size and rigid rotations effects on the dynamics and pull-in instability of electrostatically-actuated beams**<br>M. Shaat, A. Abdelkefi, New Mexico State University, Las Cruces, NM | 1530 hrs<br>AIAA-2016-0934<br>**Effects of POSS Addition on Bisphenol-E Cyanate Ester Network**<br>J. Piness, J. Wiggins, University of Southern Mississippi, Hattiesburg, MS | 1600 hrs<br>AIAA-2016-0935<br>**Modeling of strain gradient-based nanoparticle composite plates with surface elasticity**<br>M. Shaat, A. Abdelkefi, New Mexico State University, Las Cruces, NM | 1630 hrs<br>AIAA-2016-0936<br>**A Coupled Electromechanical Peridynamics Framework for Modeling Carbon Nanotube Reinforced Polymer Composites**<br>N. Prakash, G. Seidel, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1700 hrs<br>AIAA-2016-0937<br>**Experimental Characterization and Computational Analysis of Mode I Fracture Toughness of a Nano-Cellulose Z-Pin Reinforced Carbon Fiber Laminate**<br>K. Talamadupula, S. Berry, J. O'Donnell, G. Seidel, B. Goodell, Virginia Polytechnic Institute and State University, Blacksburg, VA |

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| **200-MDO-4** | **Topology Methods and Applications** | | | | | **Balboa A** |
| Chaired by: J. DEATON, Adjoint Technologies and M. KOBAYASHI, Hawaii Evolutionary Development, LLC | | | | | | |
| 1400 hrs<br>AIAA-2016-0938<br>**Multi-scale Topology Optimization**<br>P. Dunning, H. Kim, University of Bath, Bath, United Kingdom | 1430 hrs<br>AIAA-2016-0939<br>**Large-Scale Compliance-Minimization and Buckling Topology Optimization of the Undeformed Common Research Model Wing**<br>T. Chin, G. Kennedy, Georgia Institute of Technology, Atlanta, GA | 1500 hrs<br>AIAA-2016-0940<br>**A New Topology Optimization Method for Simultaneous Design of Component Layout and Frame Structure of Aircraft Wing**<br>M. Bakhtiarinejad, S. Lee, University of Maryland, Baltimore County, Baltimore, MD; J. Joo, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1530 hrs<br>AIAA-2016-0941<br>**Experimental Validation of Structures Optimised for Frequency Constraints and Dynamic Loading**<br>D. Munk, N. Giannelis, G. Vio, University of Sydney, Sydney, Australia | 1600 hrs<br>AIAA-2016-0942<br>**On a Bio-Inspired Design Methodology for the Simultaneous Topology, Shape, Sizing and Subsystem Placement Optimization of Aircrafts**<br>M. Kobayashi, Hawaii Evolutionary Development, LLC, Honolulu, HI; R. Kolonay, J. Deaton, R. Reuter, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1630 hrs<br>AIAA-2016-0943<br>**Combined mesh and penalization adaptivity based topology optimization**<br>D. Gupta, M. Langelaar, F. van Keulen, Delft University of Technology, Delft, The Netherlands | |

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| **201-MST-5** | **Uninhabited Aerial Systems and Vehicle Dynamics** | | | | | **Golden Hill A** |
| Chaired by: D. KEATING and P. KENNEY, NASA Langley Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0944<br>**UAV Control and Simulation Using Trajectory Transcriptions**<br>C. Ashokkumar, G. York , U.S. Air Force Academy, Colorado Springs, CO | 1430 hrs<br>AIAA-2016-0945<br>**Recursive Bayesian Estimation of Bat Flapping Flight Using Kinematic Trees**<br>M. Bender, H. McClelland, A. Kurdila, R. Mueller, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1500 hrs<br>AIAA-2016-0946<br>**Arduino Based Low-Cost Experimental Unmanned Aerial Flight System For Attitude Determination in Autonomous Flights**<br>J. Rico, K. Turkoglu, San Jose State University, San Jose, CA | 1530 hrs<br>AIAA-2016-0947<br>**Simulation Enviroment for Testing UAS Collision Avoidance System**<br>S. Bhandari, E. Gomez, D. Garcia, M. Piana, M. Ritterbush, California Polytechnic State University, Pomona, CA | | | |

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| **202-NDA-3** | **Testing in Support of Model Calibration or Uncertainty Quantification** | | | | | **Old Town B** |
| Chaired by: E. WALKER, NASA Langley Research Center and B. SMARSLOK, Air Force Reseach Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-0948<br>**Robust Statistical Modeling of Piezoelectric Axial Fatigue Tests using Bayesian Model Averaging**<br>J. Beck, Perceptive Engineering Analytics, Lino Lakes, MN; O. Scott-Emuakpor, J. Brown, T. George, C. Holycross, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1430 hrs<br>AIAA-2016-0949<br>**Improved Test Planning and Analysis Through the Use of Advanced Statistical Methods**<br>L. Green, NASA Langley Research Center, Hampton, VA; K. Maxwell, University of Minnesota, Minneapolis, Minneapolis, MN; D. Glass, W. Vaughn, NASA Langley Research Center, Hampton, VA; W. Barger, University of Washington, Seattle, Seattle, WA; M. Cook, Brigham Young University, Provo, UT | 1500 hrs<br>AIAA-2016-0950<br>**Simulating Future Test and Redesign Considering Epistemic Model Uncertainty**<br>N. Price, University of Florida, Gainesville, Gainesville, FL; M. Balesdent, . Defoort, ONERA, Palaiseau, France; R. Le Riche, École Nationale Supérieure des Mines de Saint-Étienne, Saint-Etienne, France; N. Kim, R. Haftka, University of Florida, Gainesville, Gainesville, FL | 1530 hrs<br>AIAA-2016-0951<br>**A-B Basis Allowable Test Reduction Approach and Composite Generic Basis Strength Values**<br>F. Abdi, AlphaSTAR Corporation, Long Beach, CA; E. Clarkson, Wichita State University, Wichita, KS; C. Godines, S. DorMohammadi , AlphaSTAR Corporation, Long Beach, CA | 1600 hrs<br>AIAA-2016-0952<br>**Robust Test Resource Allocation using Global Sensitivity Analysis**<br>C. Li, S. Mahadevan, Vanderbilt University, Nashville, TN | 1630 hrs<br>AIAA-2016-0953<br>**Experimental Validation of Polynomial Chaos Theory on an Aircraft T-Tail**<br>P. Cheema, D. Munk, N. Giannelis, G. Vio, University of Sydney, Sydney, Australia | |

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| **203-PANEL-6**<br>**1400 - 1600 hrs** | **Tuesday Afternoon Forum 360**<br><br>**Cybersecurity Below 30,000 Feet—Applying Lessons From Other Industries** | **Seaport F-G** |

Moderator: Chan Lieu, Senior Legislative Advisor, Venable,

Panelists:

**Jeffrey Carr**
CEO
Taia Global

**Scott Erven**
Associate Director
Protiviti

**Jake Olcott**
VP Business Development
BitSight

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| **204-PC-8** | **Micro-Propulsion, Plasma Discharges, Autoignition** | | | | | **Cortez Hill C** |
| Chaired by: C. CADOU, University of Maryland and M. COIL, Orbital Technologies Corporation | | | | | | |
| 1400 hrs<br>AIAA-2016-0954<br>**Performance Testing of Various Nozzle Designs for Water Electrolysis Thruster**<br>Y. Liu, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1430 hrs<br>AIAA-2016-0955<br>**Coarse graining of Ethylammonium Nitrate using Effective Field Coarse Graining Method**<br>N. Mehta, D. Levin, University of Illinois, Urbana-Champaign, Urbana, IL | 1500 hrs<br>AIAA-2016-0956<br>**Near-blowoff dynamics of lean premixed flames stabilized on a meso-scale bluff body**<br>Y. Kim, B. Lee, H. Im, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia | 1530 hrs<br>AIAA-2016-0957<br>**Monte Carlo Simulation of the Effect of "Hot" Atoms on Active Species Production in High-Voltage Pulsed Discharges**<br>N. Aleksandrov, A. Ponomarev, Moscow Institute of Physics and Technology, Moscow, Russia ; A. Starikovskiy, Princeton University, Princeton, NJ | 1600 hrs<br>AIAA-2016-0958<br>**Measurements of Low Temperature Oxidation of n-Heptane/$O_2$/Ar Mixtures in Nanosecond-pulsed Plasma Discharges**<br>A. Rousso, J. Lefkowitz, Y. Ju, Princeton University, Princeton, NJ | 1630 hrs<br>AIAA-2016-0959<br>**Comparative Shock-Tube Study of Autoignition and Plasma-Assisted Ignition of C2-Hydrocarbons**<br>I. Kosarev, S. Kindysheva, E. Plastinin, N. Aleksandrov, Moscow Institute of Physics and Technology, Moscow, Russia ; A. Starikovskiy, Princeton University, Princeton, NJ | 1700 hrs<br>AIAA-2016-0960<br>**The Effect of Ozone Addition on Autoignition and Flame Stabilization**<br>X. Gao, J. Zhai, W. Sun, Georgia Institute of Technology, Atlanta, GA; T. Ombrello, C. Carter, Air Force Research Laboratory, Wright-Patterson AFB, OH |

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| **205-SATS-2** | **Small Satellites - Technologies II** | | | | | **Ocean Beach** |
| Chaired by: J. STRAUB, University of North Dakota | | | | | | |
| 1400 hrs<br>AIAA-2016-0961<br>**Selection of an Inertial Measurement Unit for High Accuracy CubeSat Attitude Determination**<br>M. Sorgenfrei, M. Nehrenz, D. Kemp, NASA Ames Research Center, Moffett Field, CA | 1430 hrs<br>AIAA-2016-0962<br>**Dual Propulsion System Design for Small Spacecraft**<br>A. Ratheesh, K. Naik, P. Putambekar, P. Shrivastava, J. Dhanasekaran, P. Malani, SRM University, Chennai, India; et al. | 1500 hrs<br>AIAA-2016-0963<br>**Development of an Additively Manufactured Microthruster for Nanosatellite Applications**<br>K. Gagne, D. Hitt, University of Vermont, Burlington, Burlington, VT; M. McDevitt, GreenScale Technologies, South Burlington, VT | 1530 hrs<br>AIAA-2016-0964<br>**System Design and Dynamic Analysis for Sail Deployment for Cube Satellite CNUSAIL-1**<br>S. Song, Y. Yoo, S. Koo, S. Kim, J. Suk, Chungnam National University, Daejeon, South Korea | 1600 hrs<br>AIAA-2016-0965<br>**Feasibility for Orbital Life Extension of a CubeSat Flying in the Lower Thermosphere**<br>J. Blandino, N. Martinez, M. Demetriou, N. Gatsonis, Worcester Polytechnic Institute, Worcester, MA; N. Paschalidis, NASA Goddard Space Flight Center, Greenbelt, MD | 1630 hrs<br>AIAA-2016-0966<br>**Utilizing the Globalstar Network for Satellite Communications in Low Earth Orbit**<br>A. Santangelo, sci_Zone, Inc., Holland, MI; P. Skentzos, Dornerworks, Grand Rapids, MI | |

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| **206-SCS-2** | **High-Strain Composite Materials and Structures** | | | | | **Balboa B** |
| Chaired by: D. MURPHY, Orbital ATK-Space Components and J. STEEVES, NASA JPL | | | | | | |
| 1400 hrs<br>AIAA-2016-0967<br>**Deployment Testing of Flexible Composite Hinges in Bi-Material Beams**<br>J. Sauder, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; B. Trease, University of Toledo, Toledo, OH | 1430 hrs<br>AIAA-2016-0968<br>**Reconfigurable Deployable CubeSat Solar Arrays Usin Thin Composite Flexures**<br>R. Yasin, M. Santer, Imperial College London, London, United Kingdom | 1500 hrs<br>AIAA-2016-0969<br>**Precision High Strain Composite Hinges for the Deployable In-Space Coherent Imaging Telescope**<br>M. Silver, M. Echter, B. Reid, Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA; J. Banik, Air Force Research Laboratory, Kirtland AFB, NM | 1530 hrs<br>AIAA-2016-0970<br>**Folding and Deployment of Closed Cross-Section Dual-Matrix Composite Booms**<br>M. Sakovsky, S. Pellegrino, California Institute of Technology, Pasadena, CA; H. Mallikarachchi, University of Moratuwa, Katubedda, Sri Lanka | 1600 hrs<br>AIAA-2016-0971<br>**Free Deployment of a Sparse-Isogrid Column with High Strain Composite Ribs**<br>S. Jeon, LoadPath, LLC, Albuquerque, NM; J. Banik, M. Peterson, Air Force Research Laboratory, Kirtland AFB, NM | | |

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| **207-SE-3** | **Systems Engineering III** | | | | | **Balboa C** |
| Chaired by: M. BAILEY, Defense Acquisition University and V. JOHNSON, Textron Aviation | | | | | | |
| 1400 hrs<br>AIAA-2016-0972<br>**A Game Theory approach to Bargaining over Attributes of Complex Systems in the context of Value-Driven Design**<br>G. Bhatia , H. Kannan, C. Bloebaum, Iowa State University, Ames, IA | 1430 hrs<br>AIAA-2016-0973<br>**Understanding the Impact of Uncertainty on the Fidelity of the Value Model**<br>T. Subramanian, A. Khol, H. Kannan, E. Winer, C. Bloebaum, Iowa State University, Ames, IA | 1500 hrs<br>AIAA-2016-0974<br>**Quantifying the Effect of Orbit Altitude on Mission Cost for Earth Observation Satellites**<br>A. Shao, A. Madni, J. Wertz, University of Southern California, Los Angeles, CA | 1530 hrs<br>AIAA-2016-0975<br>**The Devil is in the Detail – Continuous Airworthiness of Aircraft Servo Control Units**<br>T. Lammering, P. Forschner, L. Faleiro, T. Schneider, Liebherr-Aerospace Lindenberg GmbH, Lindenberg , Germany | 1600 hrs<br>AIAA-2016-0976<br>**Fundamentals of Weapon System Sustainment**<br>C. Vono, Self, Ogden, UT | | |

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| **208-STR-6** | **Composite Fatigue Damage Prediction Methods** | | | | | **La Jolla A** |
| Chaired by: G. MABSON, Boeing Engineering Operations & Technology and K. LIN, University of Washington | | | | | | |
| 1400 hrs<br>AIAA-2016-0977<br>**Fatigue Analysis of Notched Laminates: A Time-Efficient Macro-Mechanical Approach**<br>P. Naghipour, Ohio Aerospace Institute, Cleveland, OH; E. Pineda, B. Bednarcyk, S. Arnold, NASA Glenn Research Center, Cleveland, OH; A. Waas, University of Michigan, Ann Arbor, Ann Arbor, MI | 1430 hrs<br>AIAA-2016-0978<br>**Fatigue Validation of Composite Open Hole Analysis Technique for Standard and Nonstandard Laminate - Part 2**<br>F. Abdi, C. Godines, S. DorMohammadi , AlphaSTAR Corporation, Long Beach, CA; L. Minnetyan, Clarkson University, Potsdam, NY | 1500 hrs<br>AIAA-2016-0979<br>**Fatigue Life Prediction of IM7/977-3 Composite Laminates with Multispatial/Multitemporal Homogenization**<br>M. Bogdanor, C. Oskay, Vanderbilt University, Nashville, TN | 1530 hrs<br>AIAA-2016-0980<br>**Three-Dimensional Delamination Analysis in Composite Open Hole Tensile Specimens with Cohesive Zone Method**<br>B. Bartan, B. Acar, ROKETSAN Missile Industries, Inc., Ankara, Turkey; A. Kayran, Middle East Technical University, Ankara, Turkey | 1600 hrs<br>AIAA-2016-0981<br>**Interlaminar Fatigue Growth for Fail-Safe Life Limit Analysis**<br>B. Flansburg, Lockheed Martin Corporation, Marietta, GA; C. Rousseau, Lockheed Martin Corporation, Fort Worth, TX; J. Action, Lockheed Martin Corporation, Marietta, GA | 1630 hrs<br>AIAA-2016-0982<br>**Fatigue Life of Postbuckled Structures with Indentation Damage**<br>C. Davila, NASA Langley Research Center, Hampton, VA; C. Bisagni, Delft University of Technology, Delft, The Netherlands | |

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| **209-STR-7** | **Failure Analysis and Prediction II** | | | | | **La Jolla B** |
| Chaired by: C. MERRETT, Carleton University and P. AGGARWAL, NASA Marshall Space Flight Center | | | | | | |
| 1400 hrs<br>AIAA-2016-0983<br>**Progressive Failure Based On Strain Invariant Failure Theory**<br>V. Goyal, C. Garcia, University of Puerto Rico, Mayaguez, | 1430 hrs<br>AIAA-2016-0984<br>**A Residual Strength Prediction Methodology for Composite Laminates Wth Surface Damage Under Tensile Loading**<br>S. Russell, Triumph Aerostructures, Arlington, TX | 1500 hrs<br>AIAA-2016-0985<br>**Probabilistic First Ply Failure Analysis of Wind Turbine Blade Laminates**<br>G. Mustafa, A. Suleman, C. Crawford, University of Victoria, Victoria, Canada | 1530 hrs<br>AIAA-2016-0986<br>**Thermal Ablation in Fiber-Reinforced Composite Laminates Subjected to Continuing Lightning Current**<br>Y. Wang, O. Zhupanska, University of Iowa, Iowa City, Iowa City, IA | 1600 hrs<br>AIAA-2016-0987<br>**Residual Stress Failure Prediction of Adhesive Bonded Joints Through a Combined CZ and XFEM Model**<br>V. Goyal, University of Puerto Rico, Mayaguez, | 1630 hrs<br>AIAA-2016-0988<br>**Predicting Composite Fatigue Life of Wind Turbine Blades Using Constituent-Level Physics and Realistic Aerodynamic Load**<br>F. Bhuiyan, D. Mavriplis, R. Fertig, University of Wyoming, Laramie, Laramie, WY | 1700 hrs<br>AIAA-2016-0989<br>**A Beam Theory for Progressively Elastic Damage in Fiber-Reinforced Composite Structures**<br>F. Jiang, W. Yu, Purdue University, West Lafayette, IN |

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| **210-TES-5** | **Design of Energy Systems** | | | | | **Gaslamp A** |
| Chaired by: S. AREPALLI | | | | | | |
| 1400 hrs<br>AIAA-2016-0990<br>**Component and System Modeling of a Direct Power Extraction System**<br>O. Vidana, M. Chaidez, B. Lovich, J. Aboud, M. Hernandez, L. Cabrera , University of Texas, El Paso, El Paso, TX; et al. | 1430 hrs<br>AIAA-2016-0991<br>**Analysis of a Directly Heated Oxyfuel Supercritical Power Generation System**<br>A. Chowdhury, L. Bugarin, A. Badhan, N. Love, University of Texas, El Paso, El Paso, TX | 1500 hrs<br>AIAA-2016-0992<br>**Development of Self-Healing Materials for use in Wind Turbine Blades**<br>A. Matt, S. Strong, R. Amano, University of Wisconsin, Milwaukee, Glendale, WI | 1530 hrs<br>AIAA-2016-0993<br>**A modified Cellular automaton model evaluation of the dendritic nucleation and growth during alloys solidification**<br>A. Reikher, Shilloh Industry, Milwaukee, WI; R. Amano, University of Wisconsin, Milwaukee, Glendale, WI | 1600 hrs<br>AIAA-2016-0994<br>**On the Computations of Aircraft Postcrash Fires**<br>E. Khalil, M. Othman, Cairo University, Giza, Egypt | 1630 hrs<br>AIAA-2016-0995<br>**Smoke Behaviour and Management in Domed Mosques**<br>E. Khalil, E. Bialy, W. Abdelmaksoud, O. Selim, Cairo University, Giza, Egypt | 1700 hrs<br>AIAA-2016-0996<br>**Numerical Investigations of Flow Patterns and Thermal Comfort in Air-Conditioned Gymnastic Sport Facility**<br>E. Khalil, T. AlHababi, Cairo University, Cairo, Egypt |

| Tuesday, 5 January 2016 | | | | | | |
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| **211-TP-6** | **Special Session: Aerothermodynamics of Meteor Entries** | | | | | **Harbor G** |
| Chaired by: A. BRANDIS, ERC Incorporated and D. PRABHU, ERC Incorporated | | | | | | |
| 1400 hrs<br>Oral Presentation<br>**NASA's New Program to Characterize Risk of Potential Asteroid Strikes**<br>J. Arnold, C. Burkhard, E. Venkatapathy, D. Morrison, NASA Ames Research Center, Moffett Field, CA | 1430 hrs<br>AIAA-2016-0997<br>**The internal structure of Earth-impacting meteoroids: The view from the microscope, the laboratory bench, and the telescope.**<br>D. Sears, K. Bryson, D. Ostrowski, NASA Ames Research Center, Moffett Field, CA | 1500 hrs<br>Oral Presentation<br>**Computational Modeling of Asteroid Airbursts**<br>M. Boslough, Sandia National Laboratories, Albuquerque, NM | 1530 hrs<br>Oral Presentation<br>**Thermophysics issues relevant to high-speed Earth entry of large asteroids**<br>D. Prabhu, D. Saunders, R. Jaffe, E. Stern, Y. Chen, S. White, NASA Ames Research Center, Moffett Field, CA; et al. | 1600 hrs<br>Oral Presentation<br>**Shock Layer Characteristics of Meteors at Entry Velocities below 25 km/s**<br>C. Johnston, NASA Langley Research Center, Hampton, VA; A. Brandis, NASA Ames Research Center, Moffett Field, CA | 1630 hrs<br>AIAA-2016-0998<br>**Numerical Simulation of Bolide Entry with Ground Footprint Prediction**<br>M. Aftosmis, M. Nemec, D. Mathias, NASA Ames Research Center, Moffett Field, CA; M. Berger, New York University, New York, NY | 1700 hrs<br>AIAA-2016-0999<br>**Airborne observations of an asteroid entry for high fidelity modeling**<br>P. Jenniskens, SETI Institute, Mountain View, CA; J. Grinstead, NASA Ames Research Center, Moffett Field, CA |

| Tuesday, 5 January 2016 | | | | | | |
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| **212-UMS-4** | **Unmanned Systems: UAS Integration into National Airspace System and Civil Applications** | | | | | **Coronado A** |
| Chaired by: A. LACHER, The MITRE Corporation and V. SCHULTZ, NASA Langley Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-1000<br>**Safety Assessment of Unmanned Aerial Vehicle Operations in an Integrated Airspace**<br>Y. Jenie, E. Van Kampen, J. Ellerbroek, J. Hoekstra, Delft University of Technology, Delft, The Netherlands | 1430 hrs<br>AIAA-2016-1001<br>**A Game Theoretical Modeling and Simulation Framework For The Integration Of Unmanned Aircraft Systems In To The National Airspace**<br>N. Musavi, Bilkent University, Ankara, Turkey; K. Tekelioğlu, Bogazici University, Ankara, Turkey; Y. Yildiz, K. Gunes, D. Onural, Bilkent University, Ankara, Turkey | 1500 hrs<br>AIAA-2016-1002<br>**The Impact of Suggestive Maneuver Guidance on UAS Pilot Performing the Detect and Avoid Function**<br>R. Rorie, L. Fern, San Jose State University, San Jose, CA; J. Shively, NASA Ames Research Center, Moffett Field, CA | 1530 hrs<br>AIAA-2016-1003<br>**Linear-Optimization-Based Path Planning Algorithm for an Agricultural UAV**<br>A. Noriega, R. Anderson, Embry-Riddle Aeronautical University, Daytona Beach, FL | 1600 hrs<br>AIAA-2016-1004<br>**Use of a Small Unmanned Aircraft System for autonomous fire spotting at the Great Dismal Swamp**<br>M. Logan, L. Glaab, NASA Langley Research Center, Hampton, VA; T. Craig, U.S. Fish and Wildlife Service, Suffolk, VA | 1630 hrs<br>AIAA-2016-1005<br>**Wildfire Plume Tracking and Dynamics Using UAS**<br>F. Keating, T. Mitchell, J. Kidd, J. Jacob, Oklahoma State University, Stillwater, OK | |

| Tuesday, 5 January 2016 | | | | | | |
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| **213-WE-4** | **Wind Energy: Aero-Elastic Modeling and Validation** | | | | | **Harbor I** |
| Chaired by: L. MANUEL, University of Texas at Austin | | | | | | |
| 1400 hrs<br>AIAA-2016-1006<br>**The Unsteady Aerodynamic Response of an Airfoil with Microtabs and it's Implications for Aerodynamic Damping**<br>M. Lennie, A. Bach, G. Pechlivanoglou, C. Nayeri, C. Paschereit, Technical University of Berlin, Berlin, Germany | 1430 hrs<br>AIAA-2016-1007<br>**Development and Validation of a New Unsteady Airfoil Aerodynamics Model Within AeroDyn**<br>R. Damiani, G. Hayman, Q. Wang, J. Jonkman, National Renewable Energy Laboratory, Golden, CO; A. Gonzalez, CENER, Navarra, Spain | 1500 hrs<br>AIAA-2016-1008<br>**Verification and Validation of FAST for Aero-Elastically Tailored Blades**<br>S. Guntur, S. Schreck, J. Jonkman, National Renewable Energy Laboratory, Golden, CO; M. Singh, M. Hind, Siemens, Boulder, CO | 1530 hrs<br>AIAA-2016-1009<br>**Aeroelastic stability evaluation of bend-twist coupled composite wind turbine blades designed for load alleviation in wind turbine systems**<br>T. Farsadi, A. Kayran, Middle East Technical University, Ankara, Turkey | 1600 hrs<br>AIAA-2016-1010<br>**Using Pretwist to Reduce Power Loss of Bend-Twist Coupled Blades**<br>A. Stäblein, C. Tibaldi, M. Hansen, Technical University of Denmark, Roskilde, Denmark | | |

| Tuesday, 5 January 2016 | | |
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| **214-NW-8**<br>**1530 - 1600 hrs** | **Tuesday Afternoon Networking Coffee Break** | **Session Room Foyers** |

| Tuesday, 5 January 2016 | | |
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| **215-PANEL-7**<br>**1530 - 1730 hrs** | **DSC: Panel Discussion and Open Forum on the 2nd Aeroelastic Prediction Workshop** | **Harbor A** |

| Tuesday, 5 January 2016 | | |
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| **216-LEC-6**<br>**1730 - 1830 hrs** | **Dryden Lectureship in Research** | **Seaport F-G** |
| *Blended Wing Body Technology Readiness*<br>**Robert H. Liebeck**<br>Senior Technical Fellow<br>The Boeing Company | | |

| Tuesday, 5 January 2016 | | |
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| **217-NW-9**<br>**1830 - 2000 hrs** | **Reception in the Exposition Hall** | **Exposition Hall** |
| Doors Open at 1815 hrs. | | |

| Wednesday, 6 January 2016 | | |
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| 218-NW-10<br>0700 - 0730 hrs | Wednesday Early Morning Networking Coffee Break | Session Room Foyers |

| Wednesday, 6 January 2016 | | |
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| 219-SB-3<br>0730 - 0800 hrs | Wednesday Morning Speakers' Briefing | Session Rooms |

| Wednesday, 6 January 2016 | | |
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| 220-PLNRY-3<br>0800 - 0900 hrs | Wednesday Morning Keynote | Seaport A-E |

*Designing for Resilience*
**Jeff Holland**
Director
U.S. Army Engineer Research and Development Center

| Wednesday, 6 January 2016 | | | | | | |
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| 221-AA-5 | Aeroacoustics - Advanced Measurement and Experiment | | | | | Nautical |
| Chaired by: E. NESBITT, The Boeing Company and C. ROYALTY, Honeywell | | | | | | |
| 0900 hrs<br>AIAA-2016-1011<br>**On the factors affecting the performance of the generalized cross validation method in the context of nearfield acoustic holography**<br>K. Chelliah, G. Raman, R. Muehleisen, Illinois Institute of Technology, Chicago, IL | 0930 hrs<br>AIAA-2016-1012<br>**Tomographic-PIV investigation of the flow over serrated trailing-edges**<br>F. Avallone, C. Arce Leon, S. Pröbsting, K. Lynch, D. Ragni, Delft University of Technology, Delft, The Netherlands | 1000 hrs<br>AIAA-2016-1013<br>**Vibro-acoustic analysis of flight test data comprising fuselage vibrations, external pressure and interior cabin noise measurements**<br>M. Norambuena, M. Böswald, Y. Govers, German Aerospace Center (DLR), Göttingen, Germany | 1030 hrs<br>AIAA-2016-1014<br>**PIV Investigation of the Flow Past Solid and Slitted Sawtooth Serrated Trailing Edges**<br>C. Arce Leon, F. Avallone, S. Pröbsting, D. Ragni, Delft University of Technology, Delft, The Netherlands | 1100 hrs<br>AIAA-2016-1015<br>**Supersonic Jet Impingement on a Model-scale Jet Blast Deflector**<br>T. Worden, C. Shih, F. Alvi, Florida State University, Tallahassee, FL | 1130 hrs<br>AIAA-2016-1016<br>**Vibroacoustic loads during the end effects regime of clustered rockets**<br>R. Rojo, C. Tinney, University of Texas, Austin, Austin, TX; J. Ruf, NASA Marshall Space Flight Center, Huntsville, AL | |

| Wednesday, 6 January 2016 | | | | | | |
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| 222-ABPSI-5 | High Speed Propulsion Integration | | | | | Hillcrest D |
| Chaired by: S. BAUER, NASA LaRC and P. SHEA, NASA Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-1017<br>**Numerical analysis for higher ejector-jet performance in the RBCC engine combustor model**<br>S. Hasegawa, K. Tani, S. Ueda, Japan Aerospace Exploration Agency (JAXA), Kakua, Japan | 0930 hrs<br>AIAA-2016-1018<br>**Numerical simulation of shock trains in a 3D channel**<br>R. Fiévet, H. Koo, V. Raman, University of Michigan, Ann Arbor, Ann Arbor, MI; A. Auslender, NASA Langley Research Center, Hampton, VA | 1000 hrs<br>AIAA-2016-1019<br>**Multistage Optimization Applied to the Hypersonic Inward Turning Inlet Design**<br>J. Wang, J. Cai, Northwestern Polytechnical University, Xi'an, China | 1030 hrs<br>AIAA-2016-1020<br>**Bi-Objective Switching Control Design for a Tradeoff between Acceleration and Unstart in Hypersonic Airframe/ Propulsion Models**<br>X. Hao, J. Chang, B. Wen, Z. Zhang, Harbin Institute of Technology, Harbin, China | 1100 hrs<br>AIAA-2016-1021<br>**Shock Wave Structure of Supersonic Droplets in Under-expanded Jet**<br>Y. Kim, Korea Aerospace Research Institute (KARI), Daejeon, South Korea | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **223-ACD-4** | **Electric Aircraft Design** | | | | | **Bankers Hill** |
| Chaired by: R. VOS and R. BARRETT-GONZALEZ, The University of Kansas | | | | | | |
| 0900 hrs<br>AIAA-2016-1022<br>**Overcoming the Adoption Barrier to Electric Flight**<br>N. Borer, C. Nickol, F. Jones, R. Yasky, K. Woodham, J. Fell, NASA Langley Research Center, Hampton, VA; et al. | 0930 hrs<br>AIAA-2016-1023<br>**Comparison of Heat Exchanger and Thermal Energy Storage Designs for Aircraft Thermal Management Systems**<br>W. Reed, M. von Spakovsky, P. Raj, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1000 hrs<br>AIAA-2016-1024<br>**A Highly Efficient Solid Oxide Fuel Cell Power System for an All-Electric Commuter Airplane Flight Demonstrator**<br>T. Stoia, S. Atreya, P. O'Neil, The Boeing Company, Huntington Beach, CA | 1030 hrs<br>AIAA-2016-1025<br>**Modeling of Electric Motor Driven Variable Pitch Propellers for Conceptual Aircraft Design**<br>R. McDonald, California Polytechnic State University, San Luis Obispo, CA | 1100 hrs<br>AIAA-2016-1026<br>**Design and Optimization of Short-Range Aluminum-Air Powered Aircraft**<br>J. Vegh, J. Alonso, Stanford University, Stanford, CA | | |

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| **224-ACD-5** | **Transport Aircraft Design I** | | | | | **Cortez Hill A** |
| Chaired by: M. ORR, Boeing Commercial Airplanes and J. MERRET, Gulfstream Aerospace Corporation | | | | | | |
| 0900 hrs<br>AIAA-2016-1027<br>**Conceptual Design of a Single-Aisle Turboelectric Commercial Transport with Fuselage Boundary Layer Ingestion**<br>J. Welstead, NASA Langley Research Center, Hampton, VA; J. Felder, NASA Glenn Research Center, Cleveland, OH | 0930 hrs<br>AIAA-2016-1028<br>**Mission Analysis and Aircraft Sizing of a Hybrid-Electric Regional Aircraft**<br>K. Antcliff, M. Guynn, T. Marien, D. Wells, NASA Langley Research Center, Hampton, VA; S. Schneider, M. Tong, NASA Glenn Research Center, Cleveland, OH | 1000 hrs<br>AIAA-2016-1029<br>**Design Study for a Highly Fuel Efficient Regional Transport**<br>J. Kirkman, D. Wood, T. Knight, M. Gurczak, C. Rothlsiberger, K. Pan, Arizona State University, Tempe, AZ; et al. | 1030 hrs<br>AIAA-2016-1030<br>**Assessment of the Performance Potential of Advanced Subsonic Transport Concepts for NASA's Environmentally Responsible Aviation Project**<br>C. Nickol, NASA Langley Research Center, Hampton, VA; W. Haller, NASA Glenn Research Center, Cleveland, OH | 1100 hrs<br>AIAA-2016-1031<br>**Design, Economic Competitiveness, and Profitability of a 2025 LNG Fueled Turboprop for the LNG Air Transportation System**<br>J. Gibbs, B. Nagel, German Aerospace Center (DLR), Hamburg, Germany | 1130 hrs<br>AIAA-2016-1032<br>**Conceptual Design of Biplane with High Aspect Ratio Wings as Next Generation Civil Jet Transport**<br>T. Masuko, T. Imamura, K. Rinoie, University of Tokyo, Tokyo, Japan; T. Nomura, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan | |

| Wednesday, 6 January 2016 | | | | | | |
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| **225-AFM-7** | **Aircraft Flight Dynamics, Handling Qualities, and Performance I** | | | | | **Harbor A** |
| Chaired by: M. LONE, Cranfield University and B. LEONHARDT, Northrop Grumman Corporation | | | | | | |
| 0900 hrs<br>AIAA-2016-1033<br>**An Approach to Flight Control with Large Time Delays Derived from a Pulsive Human Control Strategy**<br>T. Fricke, F. Holzapfel, Technical University of Munich, Garching, Germany | 0930 hrs<br>AIAA-2016-1034<br>**Switch-Induced Simulated PIO: Relay Feedback as a Flight Test Technique for Pilot-in-the-Loop Stability**<br>W. Gray, U.S. Air Force Test Pilot School, Edwards AFB, CA | 1000 hrs<br>AIAA-2016-1035<br>**Dynamics and Aerodynamics of a Landing Airplane during a High-Speed Lateral Runway Departure**<br>D. Horak, K. Renze, National Transportation Safety Board, Washington, D.C. | 1030 hrs<br>AIAA-2016-1036<br>**Low-Speed Stability and Control of a Reduced Scale Long-Range Supersonic Configuration with Reduced-Size or No Vertical Tail**<br>S. Langston, C. Nelson, E. Livne, University of Washington, Seattle, Seattle, WA | 1100 hrs<br>AIAA-2016-1037<br>**Modeling and Bifurcation Analysis of Combat Aircraft Dynamics under Lateral C.M. Shift**<br>B. Mukherjee, M. Sinha, Indian Institute of Technology Kharagpur, Kharagpur, India | 1130 hrs<br>AIAA-2016-1038<br>**Analysis of Spin Characteristics of a High Performance Aircraft with High Alpha Yawing Moment Asymmetry**<br>J. Masud, B. Malik, Air University, Islamabad, Pakistan; S. Akhtar, National University of Sciences and Technology, Risalpur, Pakistan | |

| Wednesday, 6 January 2016 | | | | | | |
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| **226-AFM-8** | **Special Session: LOC-5: Aircraft Loss of Control (LOC) Modeling Methods** | | | | | **Coronado B** |
| Chaired by: C. BELCASTRO, NASA-Langley Research Center and D. CRIDER, National Transportation Safety Board | | | | | | |
| 0900 hrs<br>AIAA-2016-1039<br>**Parameter Estimation for Extending Flight Models into Post-Stall Regime - Invited**<br>S. Liu, Z. Luo, G. Moszczynski, P. Grant, University of Toronto, Toronto, Canada | 0930 hrs<br>AIAA-2016-1040<br>**Semi-Analytical and Empirical Approaches to Aircraft Configuration Effects on Post-Stall Aerodynamics - Invited**<br>T. Teng, T. Zhang, P. Grant, University of Toronto, Toronto, Canada | 1000 hrs<br>AIAA-2016-1041<br>**Status of Computational Aerodynamic Modeling Tools for Aircraft Loss-of-Control - Invited**<br>N. Frink, P. Murphy, H. Atkins, S. Viken, J. Petrilli, NASA Langley Research Center, Hampton, VA; A. Gopalarathnam, North Carolina State University, Raleigh, NC; et al. | 1030 hrs<br>AIAA-2016-1042<br>**Nonlinear Unsteady Aerodynamic Modeling Using Wind Tunnel and Computational Data - Invited**<br>P. Murphy, V. Klein, N. Frink, NASA Langley Research Center, Hampton, VA | 1100 hrs<br>AIAA-2016-1043<br>**Extending the operational envelope of a turbofan engine simulation into the sub-idle region - Invited**<br>J. Chapman, T. Guo, NASA Glenn Research Center, Cleveland, OH | | |

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| **227-AMT-5** | **Tomographic, Holographic and Other Volumetric Measurements** | | | | | **Harbor D** |
| Chaired by: B. THUROW, Auburn University and C. GOYNE, University of Virginia | | | | | | |
| 0900 hrs<br>AIAA-2016-1044<br>**kHz Rate Digital In-line Holography Applied to Quantify Secondary Droplets from the Aerodynamic Breakup of a Liquid Column in a Shock-Tube**<br>D. Guildenbecher, J. Wagner, J. Olles, E. Demauro, P. Farias, T. Grasser, Sandia National Laboratories, Albuquerque, NM; et al. | 0930 hrs<br>AIAA-2016-1045<br>**A Preliminary Comparison of Three Dimensional Particle Tracking and Sizing using Plenoptic Imaging and Digital In-line Holography**<br>E. Munz, Auburn University, Auburn, AL; D. Guildenbecher, P. Farias, Sandia National Laboratories, Albuquerque, NM; B. Thurow, Auburn University, Auburn, AL | 1000 hrs<br>AIAA-2016-1046<br>**Optical phase conjugate digital inline holography for correcting aberrations in particle-laden flames**<br>K. Gabet Hoffmeister, S. Kearney, D. Guildenbecher, Sandia National Laboratories, Albuquerque, NM | 1030 hrs<br>AIAA-2016-1047<br>**3-D Visualization of Compressible Flow Using a Plenoptic Camera and Background Oriented Schlieren**<br>J. Klemkowsky, B. Thurow, Auburn University, Auburn, AL; R. Mejia-Alvarez, Los Alamos National Laboratory, Los Alamos, NM | 1100 hrs<br>AIAA-2016-1048<br>**Instantaneous Pressure Measurements from Large-Scale Tomo-PTV with HFSB Tracers past a Surface-Mounted Finite Cylinder**<br>J. Schneiders, G. Caridi, A. Sciacchitano, F. Scarano, Delft University of Technology, Delft, The Netherlands | 1130 hrs<br>AIAA-2016-1049<br>**Instantaneous Pressure Reconstruction from Measured Pressure Gradient using Rotating Parallel Ray Method**<br>X. Liu, J. Moreto, S. Siddle-Mitchell, San Diego State University, San Diego, CA | 1200 hrs<br>AIAA-2016-1050<br>**Tomographic schlieren system for visualisation of supersonic jet**<br>N. Raju, Technical University of Munich (TUM Asia), Singapore, Singapore; M. Prabakar, Indian Institute of Technology Madras, Chennai, India; B. Medhi, Indian Institute of Science, Bangalore, India; O. Oliver M, T. M. Thiruchengode, Indian Institute of Technology Madras, Chennai, India |

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| **228-APA-22** | **Special Session: CREATE-AV HPC Multiphysics Applications of Full-up Air Vehicles II** | | | | | **Coronado E** |
| Chaired by: N. HARIHARAN, CREATE-AV and A. WISSINK, US Army Aeroflightdynamics Directorate | | | | | | |
| 0900 hrs<br>AIAA-2016-1051<br>**Accuracy and Performance Improvements to Kestrel's Near-Body Flow Solver**<br>D. McDaniel, R. Nichols, CREATE Kestrel Team, Arnold AFB, TN; T. Eymann, R. Starr, S. Morton, CREATE Kestrel Team, Eglin AFB, FL | 0930 hrs<br>AIAA-2016-1052<br>**CREATE-MG Capstone version 5 Applications**<br>D. Hine, J. Forsythe, B. Green, B. Hallissy, E. Lynch, T. Shafer, Naval Air Systems Command, Patuxent River, MD | 1000 hrs<br>AIAA-2016-1053<br>**X-56A Aeroelastic Flight Test Predictions**<br>D. Reasor, Air Force Research Laboratory, Eglin AFB, FL; K. Bhamidipati, Air Force Test Center, Edwards AFB, CA; A. Chin, NASA Armstrong Flight Research Center, Edwards, CA | 1030 hrs<br>AIAA-2016-1054<br>**Comparison Between HPCMP CREATE™-AV COFFE and Kestrel for Two and Three-Dimensional Turbulent Flow Cases**<br>R. Glasby, J. Erwin, University of Tennessee, Oak Ridge, Oak Ridge, TN | 1100 hrs<br>AIAA-2016-1055<br>**Time dependent Forcing for Flow Control on a FlutteringWing using HPCMP CREATE™-AV Kestrel**<br>S. Jurgen, U.S. Air Force Academy, Colorado Springs, CO | 1130 hrs<br>AIAA-2016-1056<br>**Unstructured/Structured Overset Methods for Flow Solver Using Hamiltonian Paths and Strand Grids**<br>Y. Jung, B. Govindarajan, J. Baeder, University of Maryland, College Park, College Park, MD | 1200 hrs<br>AIAA-2016-1057<br>**Maneuvering Rotorcraft Simulations Using CREATE A/V™ Helios**<br>B. Roget, Science and Technology Corporation, Moffett Field, CA; J. Sitaraman, Parallel Geometric Algorithms, LLC, Sunnyvale, CA; A. Wissink, Army Aviation and Missile Research Development and Engineering Center, Moffett Field, CA |

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| **229-APA-23/FD-27** | **Special Session: NASA's Revolutionary Computational Aerosciences I** | | | | | **Coronado D** |
| Chaired by: M. MALIK, NASA-Langley Research Center and M. ROGERS, NASA-Ames Research Center | | | | | | |
| 0900 hrs<br>Oral Presentation<br>**Revolutionary Computational Aerosciences (Invited)**<br>M. Malik, NASA Langley Research Center, Hampton, VA | 0930 hrs<br>AIAA-2016-1058<br>**Towards an Entropy Stable Spectral Element Framework for Computational Fluid Dynamics**<br>M. Carpenter, M. Parsani, E. Nielsen, NASA Langley Research Center, Hampton, VA; T. Fisher, Sandia National Laboratories, Albuquerque, NM | 1000 hrs<br>AIAA-2016-1059<br>**A Space-Time Discontinuous-Galerkin Approach for Separated Flows**<br>S. Murman, L. Diosady, A. Garai, M. Ceze, NASA Ames Research Center, Moffett Field, CA | 1030 hrs<br>AIAA-2016-1060<br>**The Space-Time Conservative Schemes for Large-Scale, Time-Accurate Flow Simulations with Tetrahedral Meshes**<br>B. Venkatachari, National Institute of Aerospace, Hampton, VA; C. Streett, C. Chang, NASA Langley Research Center, Hampton, VA; D. Friedlander, X. Wang, S. Chang, NASA Glenn Research Center, Cleveland, OH | 1100 hrs<br>AIAA-2016-1061<br>**Overview of the NASA Glenn Flux Reconstruction Based High-Order Unstructured Grid Code**<br>S. Spiegel, J. DeBonis, H. Huynh, NASA Glenn Research Center, Cleveland, OH | 1130 hrs<br>AIAA-2016-1062<br>**An Overview of Combined Uncertainty and A-Posteriori Error Bound Estimates for CFD Calculations**<br>T. Barth, NASA Ames Research Center, Moffett Field, CA | |

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| **230-APA-24** | **Low Speed, Low Reynolds Number Aerodynamics** | | | | | **Americas Cup B** |
| Chaired by: K. VANDEN, USAF | | | | | | |
| 0900 hrs<br>AIAA-2016-1063<br>**Performance Conscience Lateral Stability Tuning of Low Aspect Ratio Flyers**<br>T. Linehan, K. Mohseni, University of Florida, Gainesville, Gainesville, FL | 0930 hrs<br>AIAA-2016-1064<br>**Analytical Aerodynamic Model of Chordwise Flexible Flapping Wings in Forward Flight**<br>D. Kodali, C. Kang, University of Alabama, Huntsville, Huntsville, AL | 1000 hrs<br>AIAA-2016-1065<br>**Time Spectral Method for Unsteady Confined Viscous Flows with Variable Inflow Velocity at Low Reynolds Numbers**<br>D. Mateescu, A. Khaled, McGill University, Montréal, Canada | 1030 hrs<br>AIAA-2016-1066<br>**Experimental Investigation of Three-Dimensional Flow Development by Pitching Low-Aspect-Ratio Wing**<br>H. Yu, National Defense University, Taoyuan, Taiwan; L. Bernal, University of Michigan, Ann Arbor, Ann Arbor, MI | 1100 hrs<br>AIAA-2016-1067<br>**Three-dimensional Effects in the Wake Vortex Formation of Flapping Flat Plate in Hover**<br>S. Chintamani, A. Rege, B. Dennis, K. Subbarao, University of Texas, Arlington, Arlington, TX | 1130 hrs<br>AIAA-2016-1068<br>**Further Insight into Stratified Turbulent Wakes Behind Wings**<br>S. Gunasekaran, A. Altman, University of Dayton, Dayton, OH | |

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| **231-APA-25** | **Aerodynamic Testing: Wind-Tunnel I** | | | | | **Americas Cup C** |
| Chaired by: J. MURRAY, Sandia National Laboratories and G. GATLIN, NASA Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-1069<br>**Dynamic Wind Tunnel Simulation of Aircraft Wake Vortex Trajectory in Ground Proximity.**<br>J. Holt, K. Garry, Cranfield University, Bedford, United Kingdom | 0930 hrs<br>AIAA-2016-1070<br>**Schlieren Visualization Technique for High-Enthalpy and Low-Density Flow with LED Light Source**<br>N. Morimoto, J. Yamashita, A. Tabata, S. Aso, Y. Tani, Kyushu University, Fukuoka, Japan | 1000 hrs<br>AIAA-2016-1071<br>**Experimental Investigation of the Turbulent Aerodynamic Environment Produced by a Generic Ship**<br>A. Sydney, J. Ramsey, K. Kimmel, Naval Surface Warfare Center, West Bethesda, MD | 1030 hrs<br>AIAA-2016-1072<br>**Detection of Unsteady Boundary Layer Transition Using Three Experimental Methods**<br>K. Richter, C. Wolf, A. Gardner, C. Merz, German Aerospace Center (DLR), Göttingen, Germany | 1100 hrs<br>AIAA-2016-1073<br>**Wind Tunnel Testing of Wings in Spin**<br>A. Ragheb, M. Selig, University of Illinois, Urbana-Champaign, Urbana, IL | | |

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| **232-APA-26** | **Unsteady Aerodynamics I** | | | | | **Americas Cup D** |
| Chaired by: J. FARNSWORTH, University of Colorado Boulder and M. JURKOVICH, US Air Force | | | | | | |
| 0900 hrs<br>AIAA-2016-1074<br>**Direct Eddy Simulation of Flap Side-Edge Flow**<br>S. Balakrishnan, K. Shariff, NASA Ames Research Center, Moffett Field, CA | 0930 hrs<br>AIAA-2016-1075<br>**Least Squares Spectral Element Method For Laminar Compressible Flows**<br>J. Hasbestan, J. Newman, A. Arabshahi, University of Tennessee, Chattanooga, Chattanooga, TN | 1000 hrs<br>AIAA-2016-1076<br>**Time Resolved Flow Field Investigations of Low Reynolds number Transient Maneuvers**<br>H. Ehlers, R. Konrath, German Aerospace Center (DLR), Göttingen, Germany; M. Börner, University of the German Federal Armed Forces, Munich, Germany; R. Wokoeck, R. Radespiel, Technical University of Braunschweig, Braunschweig, Germany | 1030 hrs<br>AIAA-2016-1077<br>**Collaborative Evaluation of CFD-to-ROM Dynamic Modeling**<br>M. Ghoreyshi, U.S. Air Force Academy, Colorado Springs, CO; N. Frink, NASA Langley Research Center, Hampton, VA; M. van Rooij, National Aerospace Laboratory (NLR), Amsterdam, The Netherlands ; A. Lofthouse, R. Cummings, U.S. Air Force Academy, Colorado Springs, CO; S. Nayani, Analytical Services & Materials, Inc., Hampton, VA | 1100 hrs<br>AIAA-2016-1078<br>**Unsteady Aerodynamics and Trailing-edge Vortex Sheet of An Airfoil**<br>X. Xia, K. Mohseni, University of Florida, Gainesville, Gainesville, FL | 1130 hrs<br>AIAA-2016-1079<br>**Detached-Eddy Simulation of Ground Effect on the Wake of a High-Speed Train**<br>C. Xia, X. Shan, Z. Yang, Tongji University, Shanghai, China | |

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| **233-ASC-3** | **Design and Testing** | | | | | **Gaslamp D** |
| Chaired by: D. MCGOWAN, NASA Langley Research Center and R. BOTEZ, Ecole de Technologie Superieure | | | | | | |
| 0900 hrs<br>AIAA-2016-1080<br>**Solid-State Rotor: A Feasibility Study**<br>O. Bilgen, T. Alberts, Old Dominion University, Norfolk, VA | 0930 hrs<br>AIAA-2016-1081<br>**Transient Flow Analysis and Static Bench Measurements for an Active Trailing-Edge Flap**<br>U. Visconti, W. Eun, J. Kang, J. Lim, J. Sim, S. Shin, Seoul National University, Seoul, South Korea | 1000 hrs<br>AIAA-2016-1082<br>**Self-adaptive morphing wing model, smart actuated and controlled by using a multiloop controller based on a laminar flow real time optimizer**<br>L. Grigorie, R. Botez, A. Popov, University of Québec, Montréal, Canada | 1030 hrs<br>AIAA-2016-1083<br>**Numerical Optimization and Experimental Testing of a Morphing Wing with Aileron System**<br>A. Koreanschi, S. Oliviu, T. Ayrault, R. Botez, University of Québec, Montréal, Canada; M. Mamou, Y. Mebarki, National Research Council Canada, Ottawa, Canada | 1100 hrs<br>AIAA-2016-1084<br>**Adaptive Control and Actuation System Development for Biomimetic Morphing**<br>N. Nigam, Y. Zhang, P. Chen, Intelligent Automation, Inc., Rockville, MD; G. Wolfe, T. Pillsbury, N. Wereley, University of Maryland, College Park, College Park, MD; et al. | 1130 hrs<br>AIAA-2016-1085<br>**Design and Testing of a Lattice-based Cellular Component Active Twist Wing**<br>N. Cramer, University of California, Santa Cruz, Santa Cruz, CA; K. Cheung, S. Swei, NASA Ames Research Center, Moffett Field, CA | 1200 hrs<br>AIAA-2016-1086<br>**Primary Structural Components Characterization of an Adaptive Trailing Edge Device (ATED)**<br>I. Dimino, A. Concilio, Italian Aerospace Research Center (CIRA), Capua, Italy; R. Pecora, University of Naples "Federico II", Naples, Italy |

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| **234-DSC-1** | **Fluid-Structure Interaction in High Speed Flows** | | | | | **Gaslamp A** |
| Chaired by: P. TAYLOR, Gulfstream Aerospace Corporation and M. BHATIA, Mississippi State University | | | | | | |
| 0900 hrs<br>AIAA-2016-1087<br>**Mutual Interaction of Aerothermally Compliant Structures and Boundary Layer Transition in Hypersonic Flows**<br>Z. Riley, J. McNamara, Ohio State University, Columbus, OH | 0930 hrs<br>AIAA-2016-1088<br>**Measurement and simulation of hypersonic fluid-structural interaction on a cantilevered plate in a Mach 6 flow**<br>G. Currao, A. Neely, University of New South Wales at the Australian Defence Force Academy, Canberra, Australia; D. Buttsworth, R. Choudhury, University of Southern Queensland, Toowoomba, Australia | 1000 hrs<br>AIAA-2016-1089<br>**Efficient Treatment of Viscous Interactions for Aerothermoelastic Loads Prediction in High-Speed Flows**<br>K. Brouwer, A. Gogulapati, J. McNamara, Ohio State University, Columbus, OH | 1030 hrs<br>AIAA-2016-1090<br>**An Integrated Aerothermoelastic Analysis Framework for Predicting the Response of Composite Panels**<br>D. Huang, P. Friedmann, University of Michigan, Ann Arbor, Ann Arbor, MI | 1100 hrs<br>AIAA-2016-1091<br>**Aeroelastic Instability Boundaries for Reflecting Oblique Shockwaves on Compliant Panels**<br>N. Boyer, J. McNamara, D. Gaitonde, Ohio State University, Columbus, OH | 1130 hrs<br>AIAA-2016-1092<br>**Elastic-Viscoplastic Effects on Fluid-Thermal-Structural Interactions**<br>J. LaFontaine, A. Gogulapati, J. McNamara, Ohio State University, Columbus, OH | |

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| **235-DSC-2** | **Adaptive Aeroelastic Wing Shaping Control** | | | | | **Gaslamp C** |
| Chaired by: N. NGUYEN, NASA-Ames Research Center and F. NITZSCHE, Carleton University | | | | | | |
| 0900 hrs<br>AIAA-2016-1093<br>**Fuzzy Model-Based Optimal Variance Control of Flexible Aircraft with Actuator Amplitude and Rate Constraints.**<br>S. Swei, NASA Ames Research Center, Moffett Field, CA; M. Ayoubi, Santa Clara University, Santa Clara, CA; N. Nguyen, NASA Ames Research Center, Moffett Field, CA | 0930 hrs<br>AIAA-2016-1094<br>**Inertial Force Coupling to Nonlinear Aeroelasticity of Flexible Wing Aircraft**<br>N. Nguyen, NASA Ames Research Center, Moffett Field, CA; E. Ting, S. Lebofsky, Stinger Ghaffarian Technologies, Inc., Moffett Field, CA | 1000 hrs<br>AIAA-2016-1095<br>**Mission Adaptive Wing Shape Determination for Highly Flexible Aeroelastic Aircraft**<br>W. Su, University of Alabama, Tuscaloosa, Tuscaloosa, AL; S. Swei, NASA Ames Research Center, Moffett Field, CA; G. Zhu, Michigan State University, East Lansing, MI | 1030 hrs<br>AIAA-2016-1096<br>**Drag Identification and Reduction Technology (DIRECT) for Commercial Aircraft**<br>J. Boskovic, R. Wise, J. Jackson, Scientific Systems Company, Inc., Woburn, MA | 1100 hrs<br>AIAA-2016-1097<br>**Static and Dynamic Aeroelastic Tailoring with Variable Camber Control**<br>B. Stanford, NASA Langley Research Center, Hampton, VA | | |

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| **236-FD-28** | **CFD: Higher-Order Methods I** | | | | | **Pier** |
| Chaired by: Z. WANG, University of Kansas and T. EYMANN, CREATE-AV/Kestrel | | | | | | |
| 0900 hrs<br>AIAA-2016-1098<br>**Vertex–Centered, High-Order Schemes for Turbulent Flows**<br>H. Yang, R. Harris, CFD Research Corporation, Huntsville, AL | 0930 hrs<br>AIAA-2016-1099<br>**Finite Element Analysis of Boundary Layer Flows using a Mixed B-spline Setting on Hybrid Meshes**<br>A. Zhang, O. Sahni, Rensselaer Polytechnic Institute, Troy, NY | 1000 hrs<br>AIAA-2016-1100<br>**A Novel Efficient Reconstruction Scheme for Unstructured Grids based on Iterative Least-Squares methods**<br>Y. Tamaki, T. Imamura, University of Tokyo, Tokyo, Japan | 1030 hrs<br>AIAA-2016-1101<br>**Hyperbolic Navier-Stokes Solver for Three-Dimensional Flows**<br>Y. Nakashima, N. Watanabe, Software Cradle Company, Ltd., Osaka, Japan; H. Nishikawa, National Institute of Aerospace, Hampton, VA | | | |

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| **237-FD-29** | **Flow Control Methods and Simulations** | | | | | **Cove** |
| Chaired by: M. WEI, New Mexico State Universtiy | | | | | | |
| 0900 hrs<br>AIAA-2016-1102<br>**Domain Decomposition in POD-Galerkin Projection for Flows with Moving Boundary**<br>H. Gao, M. Wei, New Mexico State University, Las Cruces, NM | 0930 hrs<br>AIAA-2016-1103<br>**Improving Separation Control with Noise-Robust Variants of Dynamic Mode Decomposition**<br>M. Hemati, University of Minnesota, Minneapolis, Minneapolis, MN; E. Deem, Florida State University, Tallahassee, FL; M. Williams, C. Rowley, Princeton University, Princeton, NJ; L. Cattafesta, Florida State University, Tallahassee, FL | 1000 hrs<br>AIAA-2016-1104<br>**Improved Delayed Detached Eddy Simulation of Flow Structures behind A Backward-Facing Step**<br>R. Hu, L. Wang, S. Fu, Tsinghua University, Beijing, China | 1030 hrs<br>AIAA-2016-1105<br>**Parametric Investigation of Under-Expanded Jet Receptivity to Asymmetric Active Control**<br>D. Gonzalez, Naval Surface Warfare Center, Indian Head, MD; D. Gaitonde, Ohio State University, Columbus, OH; M. Lewis, Institute for Defense Analyses, Washington, D.C. | 1100 hrs<br>AIAA-2016-1106<br>**On the Symmetrization in POD-Galerkin Model for Linearized Compressible Flows**<br>M. Tabandeh, M. Wei, New Mexico State University, Las Cruces, NM; J. Collins, Army Research Laboratory, Aberdeen Proving Ground, MD | 1130 hrs<br>AIAA-2016-1107<br>**Reduction of Aerodynamic Drag on a Commercial Pickup Truck via External Flow Devices**<br>C. Spike, T. Finn, E. Dubreuil, A. Wessner, S. Lee, Alfred University, Alfred, NY | |

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| **238-FD-30** | **Jet Flows II** | | | | | **Promenade B** |
| Chaired by: J. NAUGHTON, University of Wyoming and M. GLAUSER, Syracuse University | | | | | | |
| 0900 hrs<br>AIAA-2016-1108<br>**Identifying Coherent Structures in a 3-Stream Supersonic Jet Flow Using Time-Resolved Schlieren Imaging**<br>A. Tenney, T. Coleman, J. Lewalle, M. Glauser, Syracuse University, Syracuse, NY; B. Kiel, Air Force Research Laboratory, Washington, D.C.; S. Gogineni, Spectral Energies, LLC, Dayton, OH | 0930 hrs<br>AIAA-2016-1109<br>**Physics of Twinjet Plume Interactions**<br>K. Goparaju, D. Gaitonde, S. Bhaumik, Ohio State University, Columbus, OH; D. Garmann, Air Force Research Laboratory, Dayton, OH | 1000 hrs<br>AIAA-2016-1110<br>**Investigation of Rectangular Jet Issuing From a Varying Cross-Section Nozzle**<br>S. Sengupta, L. Agostini, U. Sasidharan Nair, D. Gaitonde, Ohio State University, Columbus, OH | 1030 hrs<br>AIAA-2016-1111<br>**Experimental Investigation of the Structure of Turbulent Swirling Jets**<br>E. DeMillard, J. Naughton, University of Wyoming, Laramie, Laramie, WY | 1100 hrs<br>AIAA-2016-1112<br>**An Axisymmetric Underexpanded Jet Flowing Parallel to an Adjacent Planar Surface**<br>R. Hortensius, G. Elliott, J. Dutton, University of Illinois, Urbana-Champaign, Urbana, IL | 1130 hrs<br>AIAA-2016-1113<br>**An Investigation of Twin Supersonic Jet Coupling**<br>C. Kuo, J. Cluts, M. Samimy, Ohio State University, Columbus, OH | |

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| **239-FD-31** | **RANS/LES Methods and Techniques I** | | | | | **Harbor E** |
| Chaired by: P. MORGAN, Ohio Aerospace Institute and R. BOND | | | | | | |
| 0900 hrs<br>AIAA-2016-1114<br>**Computation of Turbulent Flow in a Lid-Driven 2D Cavity and a 3D Box Using a Number of Turbulence Models**<br>H. Nagapetyan, T. Wray, R. Agarwal, Washington University in St. Louis, St. Louis, MO | 0930 hrs<br>AIAA-2016-1115<br>**High-Fidelity Simulations of the HIFiRE-6 Flow Path**<br>N. Bisek, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1000 hrs<br>AIAA-2016-1116<br>**Analysis of spatio-temporal wake modes of space launchers at transonic flow**<br>V. Statnikov, B. Roidl, M. Meinke, W. Schroeder, RWTH Aachen University, Aachen, Germany | 1030 hrs<br>AIAA-2016-1117<br>**Numerical Prediction of the Minimum Height of Roughness Strip for Artificial Transition on Swept Wings**<br>Y. Tian, Z. Zhang, . Zhai, Northwestern Polytechnical University, Xi'an, China; K. Qu, City University of New York, New York, NY | 1100 hrs<br>AIAA-2016-1118<br>**Dynamic Hybrid RANS/LES Computations of a Supersonic Cavity**<br>E. Hassan, Air Force Research Laboratory, Wright-Patterson AFB, OH; D. Peterson, Innovative Scientific Solutions, Inc., Dayton, OH; K. Walters, E. Luke, Mississippi State University, Starkville, MS | 1130 hrs<br>AIAA-2016-1119<br>**Modeling low-Reynolds-number flow over rough airfoils**<br>D. Kessler, R. Johnson, A. Corrigan, J. Thomas, S. Qidwai, Naval Research Laboratory, Washington, D.C. | |

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| **240-FD-32** | **Subsonic Boundary Layers** | | | | | **Harbor F** |
| Chaired by: Z. BERGER and A. SESCU, Mississippi State University | | | | | | |
| 0900 hrs<br>AIAA-2016-1120<br>**Turbulence Amplitude Modulation in an Externally Forced, Subsonic Turbulent Boundary Layer**<br>P. Ranade, University of Notre Dame, Notre Dame, IN; S. Duvvuri, B. McKeon, California Institute of Technology, Pasadena, CA; S. Gordeyev, K. Christensen, E. Jumper, University of Notre Dame, Notre Dame, IN | 0930 hrs<br>AIAA-2016-1121<br>**Simultaneous Wall Shear Stress and Velocity Measurements in a Flat Plate Turbulent Boundary Layer**<br>R. Pabon, C. Barnard, L. Ukeiley, M. Sheplak, University of Florida, Gainesville, Gainesville, FL | 1000 hrs<br>AIAA-2016-1122<br>**Can Surface Streaks Counteract Boundary Layer Streaks?**<br>A. Sescu, Mississippi State University, Starkville, MS; M. Afsar, Imperial College London, London, United Kingdom | 1030 hrs<br>AIAA-2016-1123<br>**An Experimental Study on The Transient Behavior of Wind-Driven Water Runback over a Flat Surface**<br>K. Zhang, H. Hu, Iowa State University, Ames, IA | 1100 hrs<br>AIAA-2016-1124<br>**Interaction of Rectangular Synthetic Jet with a Turbulent Boundary Layer**<br>G. Gomit, University of Southampton, Southampton, United Kingdom; Z. Berger, University of Toronto, Toronto, Canada; B. Ganapathisubramani, University of Southampton, Southampton, United Kingdom; P. Lavoie, University of Toronto, Toronto, Canada | | |

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| **241-FD-33** | **Surface Roughness & Disturbances in Supersonic Flow** | | | | | **Promenade A** |
| Chaired by: J. POGGIE, Purdue University- Sch of Aero and Astro and R. BOWERSOX, Texas A&M University | | | | | | |
| 0900 hrs<br>AIAA-2016-1125<br>**A Parametric Study into the Effects of Surface Roughness Spacing on the Transition of Hypersonic Boundary Layers**<br>O. Taylor, P. Bruce, Imperial College London, London, United Kingdom | 0930 hrs<br>AIAA-2016-1126<br>**Fluid-Structure Interactions using Controlled Disturbances on a Slender Cone at Mach 8**<br>K. Casper, S. Beresh, J. Henfling, R. Spillers, Sandia National Laboratories, Albuquerque, NM | 1000 hrs<br>AIAA-2016-1127<br>**Computation of Turbulent Heat Flux with Roughness Induced Transition in High Enthalpy Shock Tunnel HIEST**<br>T. Ishihara, Y. Ogino, N. Ohnishi, Tohoku University, Sendai, Japan; H. Tanno, Japan Aerospace Exploration Agency (JAXA), Kakuda, Japan; K. Sawada, Tohoku University, Sendai, Japan | 1030 hrs<br>AIAA-2016-1128<br>**Direct Numerical Simulation of Shock/Boundary Layer Interaction over Surface Roughness Using the High-Oder FR/CPR-LLAV Method**<br>M. Yu, University of Maryland, Baltimore County, Baltimore, MD | | | |

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| **242-GNC-21** | **Spacecraft De-Orbiting, Reentry and Landing** | | | | | **Hillcrest B** |
| Chaired by: J. REED, United Launch Alliance, LLC and U. SHANKAR, The Johns Hopkins University Applied Physics Laboratory | | | | | | |
| 0900 hrs<br>AIAA-2016-1129<br>**Tether Dynamics Analysis for Active Space Debris Removal**<br>H. Linskens, E. Mooij, Delft University of Technology, Delft, The Netherlands | 0930 hrs<br>AIAA-2016-1130<br>**Station Relocation and Deorbit Using Electric Propulsion**<br>J. Gill, D. Stratemeier, Space Systems/ Loral, Palo Alto, CA | 1000 hrs<br>AIAA-2016-1131<br>**Aerodynamic Oscillation and Attitude Control Analysis for Reentry Capsule using OREX Flight Data and Wind Tunnel Data**<br>S. Matsumoto, Y. Kondoh, S. Nagai, R. Tagai, T. Imada, E. Nakano, Japan Aerospace Exploration Agency (JAXA), Tsukuba, Japan | 1030 hrs<br>AIAA-2016-1132<br>**Two-Dimensional Experimental Investigation of Base-Extension Separation Mechanism with Telescopic Gear**<br>N. Saeki, S. Hara, Nagoya University, Nagoya, Japan; M. Otsuki, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan | 1100 hrs<br>AIAA-2016-1133<br>**Passive Hazard Detection for Planetary Landing**<br>S. Woicke, E. Mooij, Delft University of Technology, Delft, The Netherlands | 1130 hrs<br>AIAA-2016-1134<br>**Online Landing Site Selection Considering Maneuverability Constraint during Mars Powered Descent Phase**<br>D. Ge, A. Gao, P. Cui, Beijing Institute of Technology, Beijing, China | |

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| **243-GNC-22** | **GN&C Sensor Systems** | | | | | **Hillcrest A** |
| Chaired by: S. STARIN, NASA-Goddard Space Flight Center and M. MAJJI, State University of New York at Buffalo | | | | | | |
| 0900 hrs<br>AIAA-2016-1135<br>**Enhanced detection and isolation of angle of attack sensor faults**<br>D. Ossmann, German Aerospace Center (DLR), Oberpfaffenhofen, Germany | 0930 hrs<br>AIAA-2016-1136<br>**Compound eye sensor for real-time aircraft wing deflection measurement**<br>S. Frost, NASA Ames Research Center, Moffett Field, CA; G. Gorospe, C. Teubert, Stinger Ghaffarian Technologies, Inc., Moffett Field, CA | 1000 hrs<br>AIAA-2016-1137<br>**Landing Zone Determination for Autonomous Rotorcraft in Surveillance Applications**<br>J. Mackay, Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA; G. Ellingson, T. McLain, Brigham Young University, Provo, UT | 1030 hrs<br>AIAA-2016-1138<br>**Precision Onboard Small Sensor System for Unmanned Air Vehicle Testing and Control**<br>F. Arthurs, J. Valasek, Texas A&M University, College Station, TX | 1100 hrs<br>AIAA-2016-1139<br>**Modelling an Angular Accelerometer using Frequency-Response Measurements**<br>D. Jatiningrum, C. de Visser, M. van Paassen, M. Mulder, Delft University of Technology, Delft, The Netherlands | 1130 hrs<br>AIAA-2016-1140<br>**Accelerometer Bias Calibration Using Attitude and Angular Velocity Information**<br>Z. Yu, Beijing Institute of Technology, Beijing, China; J. Crassidis, State University of New York, Amherst, NY | 1200 hrs<br>AIAA-2016-1141<br>**Vacuum temperature field simulation and experiments of four-mode differential laser gyroscope**<br>X. Yu, G. Lu, H. Luo, National University of Defence Technology, Changsha, China |

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| **244-GNC-23** | **Aerospace Robotics and Unmanned/Autonomous Systems V** | | | | | **Hillcrest C** |
| Chaired by: I. SHARF, McGill University and M. LAVAGNA, Politecnico Di Milano | | | | | | |
| 0900 hrs<br>AIAA-2016-1142<br>**Path generation for rendezvous of dissimilar UAVs using Particle Swarm Optimization of Dubin's curve sets**<br>V. Jouffroy, X. Bovier-Lapierre, Institut Polytechnique des Sciences Avancées, Ivry-sur-Seine, France; O. Ariff, University of Salford, Salford, United Kingdom; T. Richer, University of Western Brittany, Brest, France | 0930 hrs<br>AIAA-2016-1143<br>**Autonomous Control of GPS Denied Guided Airdrop Systems Using Radio Beacon Feedback**<br>M. Cacan, E. Scheuermann, M. Ward, M. Costello, Georgia Institute of Technology, Atlanta, GA | 1000 hrs<br>AIAA-2016-1144<br>**Graph based dynamic policy for UAV navigation**<br>T. Mannucci, E. Van Kampen, C. de Visser, Q. Chu, Delft University of Technology, Delft, The Netherlands | 1030 hrs<br>AIAA-2016-1145<br>**Automatic Prevention of Loss of Control Due to Winds by Bandwidth Adaptation**<br>Y. Zhao, J. Zhu, Ohio University, Athens, OH | | | |

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| **245-GT-5** | **Ground Test Studies and Techniques** | | | | | **Cortez Hill B** |
| Chaired by: D. LEWIS, Aerospace Testing Alliance (ATA) and G. AYERS, U.S. Air Force | | | | | | |
| 0900 hrs<br>AIAA-2016-1146<br>**Dynamic Pressure-Sensitive Paint Demonstration in AEDC Propulsion Wind Tunnel 16T**<br>M. Sellers, M. Nelson, Aerospace Testing Alliance, Arnold AFB, TN; J. Crafton, Innovative Scientific Solutions, Inc., Dayton, OH | 0930 hrs<br>AIAA-2016-1147<br>**PIV Measurements of Mach 2.7 Turbulent Boundary Layer with Varying Reynolds Numbers**<br>J. Brooks, A. Gupta, University of Maryland, College Park, College Park, MD; M. Smith, E. Marineau, Arnold Engineering Development Center, Silver Spring, MD | 1000 hrs<br>AIAA-2016-1148<br>**Uncertainty Analysis of NASA Glenn's 8- by 6- Foot Superonic Wind Tunnel**<br>J. Stephens, Sierra Lobo, Inc., Cleveland, OH; E. Hubbard, Jacobs, Cleveland, OH; J. Walter, Jacobs, Bingham Farms, MI; T. McElroy, Jacobs, Tullahoma, TN | 1030 hrs<br>AIAA-2016-1149<br>**A New High Channel-Count, High Scan-Rate, Data Acquisition System for the NASA Langley Transonic Dynamics Tunnel**<br>T. Ivanco, D. Piatak, M. Sekula, NASA Langley Research Center, Hampton, VA; S. Simmons, W. Babel, J. Collins, Jacobs, Hampton, VA; et al. | 1100 hrs<br>AIAA-2016-1150<br>**Neural Network Model Predictive Control of Wind Tunnel Test Conditions**<br>P. Sutcliffe, M. Rennie, University of Notre Dame, Notre Dame, IN | 1130 hrs<br>AIAA-2016-1151<br>**Evaluating Environmental Control System Thermal Response to Degraded Operating Conditions**<br>T. Childs, A. Jones, R. Chen, Loughborough University, Loughborough, United Kingdom; A. Murray, BAE Systems, Warton, United Kingdom | 1200 hrs<br>AIAA-2016-1152<br>**Free Flight Testing in Hypersonic Flows: HEXAFLY-INT EFTV**<br>C. Kennell, A. Neely, University of New South Wales, Canberra, Australia; D. Buttsworth, R. Choudhury, University of Southern Queensland, Toowoomba, Australia; M. Tahtali, University of New South Wales, Canberra, Australia |

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| **246-GTE-8** | **Combustion I** | | | | | **Cortez Hill C** |
| Chaired by: C. SLABAUGH, Purdue University and J. CONVERY, GE Aviation | | | | | | |
| 0900 hrs<br>AIAA-2016-1153<br>**Combustion Blowoff Effects on the Central Recirculation Zone using various Syngas mixtures in a Tangential Swirl Burner**<br>H. Baej, A. Valera-Medina, N. Syred, R. Marsh, P. Bowen, Cardiff University, Cardiff, United Kingdom | 0930 hrs<br>AIAA-2016-1154<br>**Effect of Aviation Fuel Type and Fuel Injection Conditions on Non-reacting Spray Characteristics of Hybrid Air Blast Fuel Injector**<br>T. Buschhagen, R. Zhang, S. Naik, C. Slabaugh, S. Meyer, J. Gore, Purdue University, West Lafayette, IN; et al. | 1000 hrs<br>AIAA-2016-1155<br>**Impact of Internal Entrainment and Dilution on Enhancing Distributed Combustion**<br>A. Khalil Hasan, A. Gupta, University of Maryland, College Park, College Park, MD | 1030 hrs<br>AIAA-2016-1156<br>**Analysis of Combustion Oscillations in a Staged MLDI Burner using Decomposition Methods and Recurrence Analysis**<br>J. Wilhite, B. Dolan, University of Cincinnati, Cincinnati, OH; L. Kabiraj, Technical University of Berlin, Berlin, Germany; R. Villalva Gomez, E. Gutmark, C. Paschereit, University of Cincinnati, Cincinnati, OH | 1100 hrs<br>AIAA-2016-1157<br>**Measurement and Analysis of Flame Transfer Functions in a Lean-Premixed, Swirl-Stabilized Combustor with Water Injection**<br>N. Stadlmair, T. Sattelmayer, Technical University of Munich, Garching, Germany | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **247-HIS-2** | **Aerospace History** | | | | | **Americas Cup A** |
| Chaired by: S. RUSSI, Bigelow Aerospace | | | | | | |
| 0900 hrs<br>AIAA-2016-1158<br>**Portuguese Contribution to Early Airplane Design: The Industriousness of João Gouveia**<br>J. Sousa, Technical University of Lisbon, Lisbon, Portugal; R. Reis, Embraer, Évora, Portugal | 0930 hrs<br>AIAA-2016-1159<br>**John J. Montgomery's Circulation Theory of Lift**<br>G. Fogel, San Diego State University, San Diego, CA; C. Harwood, Harwood and Associates, Ben Lomond, CA | 1000 hrs<br>AIAA-2016-1160<br>**The First American Aeroplane Export Octave Chanute's 1904 Glider at the Threshold of Powered Flight.**<br>S. Short, National Soaring Museum, Elmira, NY | 1030 hrs<br>AIAA-2016-1161<br>**The American Legion Airplane--Those Willing to Dare--**<br>L. Forrest, Naval Weapons Station, Yorktown, VA | 1100 hrs<br>AIAA-2016-1162<br>**The American Legion Airplane - Transition to Santa Maria**<br>K. Burns, AIAA San Diego Section, San Diego, CA | 1130 hrs<br>AIAA-2016-1163<br>**Southern Nevada Aerospace History**<br>S. Russi, Bigelow Aerospace, North Las Vegas, NV; D. Henry, University of Nevada, Las Vegas, Las Vegas, NV | |

| Wednesday, 6 January 2016 | | | | | | |
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| **248-HSABP-4** | **Scramjet Inlets** | | | | | **Regatta A** |
| Chaired by: B. SARACOGLU, von Karman Institute for Fluid Dynamics and T. SMITH, Boeing Engineering Operations & Technology | | | | | | |
| 0900 hrs<br>AIAA-2016-1164<br>**Three-Dimensional Nature of Shock Trains in Rectangular Scramjet Isolators**<br>J. Geerts, K. Yu, University of Maryland, College Park, College Park, MD | 0930 hrs<br>AIAA-2016-1165<br>**Swept shock corner flow interacions**<br>R. Morajkar, M. Gamba, University of Michigan, Ann Arbor, Ann Arbor, MI | 1000 hrs<br>AIAA-2016-1166<br>**Reduced-Order Analysis of Scramjet Inlet Operation**<br>V. Gopal, D. Wilson, University of Texas, Arlington, Arlington, TX | 1030 hrs<br>AIAA-2016-1167<br>**Reduced-Order Analysis of Dual Mode Scramjet Isolator Operation**<br>V. Gopal, D. Wilson, University of Texas, Arlington, Arlington, TX | 1100 hrs<br>AIAA-2016-1168<br>**Comparison of Unstart Induced by Mass Addition and Heat Release**<br>S. Im, L. Wermer, Worcester Polytechnic Institute, Worcester, MA; D. Baccarella, Q. Liu, B. McGann, University of Notre Dame, Notre Dame, IN; H. Do, Seoul National University, Seoul, South Korea | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **249-MAT-7** | **Integrated Computational Materials Engineering (ICME)** | | | | | **Gaslamp B** |
| Chaired by: J. MATLIK, Rolls-Royce Corp and M. SANGID, Purdue University and V. VENKATESH, | | | | | | |
| 0900 hrs<br>AIAA-2016-1170<br>**Material Design Using a NURBS-based Shape Optimization**<br>A. Najafi, M. Safdari, P. Geubelle, University of Illinois, Urbana-Champaign, Urbana, IL | 0930 hrs<br>AIAA-2016-1171<br>**Development of a Structural Finite Element Progressive Failure Simulation and Integration into the ICM2 Framework**<br>J. Dustin, General Electric Company, Evendale, OH; R. Dalgarno, Autodesk, Inc., Laramie, WY; M. Hockemeyer, General Electric Company, Niskayuna, NY | 1000 hrs<br>AIAA-2016-1172<br>**Modeling of Shock Wave Propagation through Energetic Solid State Composites using a Taylor-Galerkin Scheme**<br>A. Duran, V. Sundararaghavan, University of Michigan, Ann Arbor, Ann Arbor, MI | 1030 hrs<br>AIAA-2016-1173<br>**Multi-Functional Topology Optimization of Nanocomposite Beams**<br>D. Seifert, M. Patil, G. Seidel, Virginia Polytechnic Institute and State University, Blacksburg, VA; G. Reich, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1100 hrs<br>AIAA-2016-1174<br>**Information Management Workflow and Tools Enabling Multiscale Modeling Within ICME Paradigm**<br>S. Arnold, B. Bednarcyk, NASA Glenn Research Center, Cleveland, OH; N. Austin, I. Terentjev, D. Cebon, W. Marsden, Granta Design, Cambridge, United Kingdom | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **250-MDO-5** | **Aeroelastic Sensitivity Analysis & Applications** | | | | | **Balboa A** |
| Chaired by: T. TAKAHASHI, Arizona State University and D. ALLISON, Optimal Flight Sciences LLC | | | | | | |
| 0900 hrs<br>AIAA-2016-1175<br>**Development of a High-Fidelity Time-Dependent Aero-Structural Capability for Analysis and Design**<br>D. Mavriplis, E. Anderson, R. Fertig, M. Garnich, University of Wyoming, Laramie, Laramie, WY | 0930 hrs<br>AIAA-2016-1176<br>**Adjoint Based Structure and Shape Optimization with Flutter Constraints**<br>Z. Zhang, P. Chen, ZONA Technology, Inc., Scottsdale, AZ; Q. Wang, Massachusetts Institute of Technology, Cambridge, MA; Z. Zhou, S. Yang, Z. Wang, ZONA Technology, Inc., Scottsdale, AZ | 1000 hrs<br>AIAA-2016-1177<br>**Continuum Sensitivity Analysis for Aeroelastic Shape Optimization**<br>M. Kulkarni, R. Canfield, M. Patil, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1030 hrs<br>AIAA-2016-1178<br>**Gradient Based Optimization using Spectral Formulation-Based FSI and Coupled Sensitivity Analysis**<br>R. Prasad, Virginia Polytechnic Institute and State University, Blacksburg, VA; S. Yi, Korea Advanced Institute of Science and Technology, Daejeon, South Korea ; S. Choi, D. Im, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1100 hrs<br>AIAA-2016-1179<br>**High-fidelity Aerostructural Optimization of a High Aspect Ratio Tow-steered Wing**<br>T. Brooks, University of Michigan, Ann Arbor, Ann Arbor, MI; G. Kennedy, Georgia Institute of Technology, Atlanta, GA; J. Martins, University of Michigan, Ann Arbor, Ann Arbor, MI | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **251-MST-6** | **Human Factors, Perception, and Cueing** | | | | | **Golden Hill A** |
| Chaired by: F. CARDULLO, State University of NY and A. ELMILIGUI, NASA Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-1180<br>**Development of Spatial Disorientation Demonstration Scenarios for Commercial Pilot Training**<br>D. Klyde, A. Lampton, P. Schulze, Systems Technology, Inc., Hawthorne, CA | 0930 hrs<br>AIAA-2016-1181<br>**On Effects of Failures in Haptic and Automated Pilot Support Systems**<br>M. Maimeri, University of Pisa, Pisa, Italy; M. Olivari, H. Buelthoff, Max Planck Institute for Biological Cybernetics, Tübingen, Germany; L. Pollini, University of Pisa, Pisa, Italy | 1000 hrs<br>AIAA-2016-1182<br>**Identifying Time-Varying Pilot Responses: a Recursive Least-Squares Based Approach**<br>M. Olivari, J. Venrooij, F. Nieuwenhuizen, Max Planck Institute for Biological Cybernetics, Tübingen, Germany; L. Pollini, University of Pisa, Pisa, Italy; H. Buelthoff, Max Planck Institute for Biological Cybernetics, Tübingen, Germany | 1030 hrs<br>AIAA-2016-1183<br>**Simulation-based concept development and evaluation: Augmented reality to improve communication between helicopter crew during firefighting operations**<br>R. Arents, M. Klijn, M. Roza, A. de Reus, National Aerospace Laboratory (NLR), Amsterdam, The Netherlands | 1100 hrs<br>AIAA-2016-1184<br>**Simulating Flight-Deck Mode-Confusion Incidents using Human Error Templates**<br>S. Park, B. Yang, Optimal Synthesis, Inc., Los Altos, CA | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **252-MST-7** | **Modeling of Vehicle Dynamics, Systems, and Environments** | | | | | **Golden Hill B** |
| Chaired by: S. BEARD, NASA-Ames Research Center and C. ATKINSON, Lockheed Martin Corporation | | | | | | |
| 0900 hrs<br>AIAA-2016-1185<br>**Modeling of Inertial Control Surface Hinge Moments Using Quaternion Calculations**<br>C. Atkinson, Lockheed Martin Corporation, Palmdale, CA | 0930 hrs<br>AIAA-2016-1186<br>**Simulation Framework for UAS Conceptual Design**<br>K. Jerath, Washington State University, Pullman, WA; J. Langelaan, Pennsylvania State University, University Park, PA | 1000 hrs<br>AIAA-2016-1187<br>**The Trick Simulation Toolkit: A NASA/Opensource Framework for Running Time Based Physics Models**<br>J. Penn, L-3 Communications, Houston, TX; A. Lin, NASA Johnson Space Center, Houston, TX | 1030 hrs<br>AIAA-2016-1188<br>**Extending the SPeAD-M86 Model: Incorporating the Effects of $F_{10.7}$ Variations on Atmospheric Density**<br>S. Kedare, S. Ulrich, Carleton University, Ottawa, Canada | 1100 hrs<br>AIAA-2016-1189<br>**Online Safe Flight Envelope Prediction for Damaged Aircraft: A Database-driven Approach**<br>Y. Zhang, C. de Visser, Q. Chu, Delft University of Technology, Delft, The Netherlands | 1130 hrs<br>AIAA-2016-1190<br>**An Analysis of Stochastic Disturbances on Nonlinear Missile-Target Engagements Based on the Adjoint Method**<br>E. Sezer, M. Nalci, ROKETSAN Missile Industries, Inc., Ankara, Turkey; A. Kutay, Middle East Technical University, Ankara, Turkey | 1200 hrs<br>AIAA-2016-1191<br>**Fast Modeling for Lunar Landing Dynamics Analysis**<br>J. Ding, C. Wang, Beihang University, Beijing, China |

| Wednesday, 6 January 2016 | | | | | | |
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| **253-NDA-4** | **Model Calibration, Verification, Validation, Uncertainty Quantification** | | | | | **Old Town B** |
| Chaired by: B. THACKER, Southwest Research Institute and M. RUMPFKEIL, University of Dayton | | | | | | |
| 0900 hrs<br>AIAA-2016-1192<br>**Validation, Uncertainty Quantification and Uncertainty Reduction for a Shock Tube Simulation**<br>C. Park, R. Haftka, N. Kim, University of Florida, Gainesville, Gainesville, FL | 0930 hrs<br>AIAA-2016-1193<br>**Sequential Experimental Design and Model Calibration for Targeted Events**<br>D. Villanueva, Universal Technology Corporation, Dayton, OH; B. Smarslok, Air Force Research Laboratory, Wright-Patterson AFB, OH; R. Perez, Universal Technology Corporation, Dayton, OH | 1000 hrs<br>AIAA-2016-1194<br>**Uncertainty Reduction using Bayesian Inference and Sensitivity Analysis: A Sequential Approach to the NASA Langley Uncertainty Quantification Challenge**<br>S. Sankararaman, NASA Ames Research Center, Moffett Field, CA | 1030 hrs<br>AIAA-2016-1195<br>**Anomaly Detection Using Groups of Simulations**<br>M. Fernandez-Godino, A. Diggs, C. Park, N. Kim, R. Haftka, University of Florida, Gainesville, Gainesville, FL | 1100 hrs<br>AIAA-2016-1196<br>**Development of a Prototype Model-Form Uncertainty Knowledge Base**<br>L. Green, NASA Langley Research Center, Hampton, VA | 1130 hrs<br>AIAA-2016-1197<br>**Bridging the Gap between Point Cloud and CAD: a Method to Assess Form Error in Aero Structures**<br>A. Forslund, J. Madrid, R. Söderberg, Chalmers University of Technology, Göteborg, Sweden; J. Lööf, S. Knuts, O. Isaksson, GKN Aerospace Engine Systems, Trollhättan, Sweden; et al. | |

| Wednesday, 6 January 2016 | | |
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| **254-NW-11**<br>**0900 - 0930 hrs** | **Wednesday Late Morning Networking Coffee Break** | **Exposition Hall** |

| Wednesday, 6 January 2016 | | | | | | |
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| **255-PC-9/GTE-9** | **Rotating-Detonation Engines** | | | | | **Harbor B** |
| Chaired by: J. HOKE, Innovative Scientific Solutions Incorporated and E. LYNCH, Aerojet Rocketdyne | | | | | | |
| 0900 hrs<br>AIAA-2016-1198<br>**Evaluation of Mixing Processes in a Non-Premixed Rotating Detonation Engine Using Acetone PLIF**<br>B. Rankin, Air Force Research Laboratory, Wright-Patterson AFB, OH; C. Fugger, D. Richardson, Spectral Energies, LLC, Beavercreek, OH; K. Cho, J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; A. Caswell, Air Force Research Laboratory, Wright-Patterson AFB, OH; et al. | 0930 hrs<br>AIAA-2016-1199<br>**Time-Resolved *In-Situ* Absorption Spectroscopy of a Hydrocarbon-Air Rotating Detonation Engine using a Fiber-Coupled Tunable Laser System**<br>K. Rein, S. Roy, Spectral Energies, LLC, Dayton, OH; B. Sell, Innovative Scientific Solutions, Inc., Dayton, OH; A. Caswell, Air Force Research Laboratory, Wright-Patterson AFB, OH; J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; F. Schauer, Air Force Research Laboratory, Wright-Patterson AFB, OH; et al. | 1000 hrs<br>AIAA-2016-1200<br>**Comparison of Simulated and Measured Instantaneous Heat Flux in a Rotating Detonation Engine**<br>S. Theuerkauf, F. Schauer, R. Anthony, Air Force Research Laboratory, Wright-Patterson AFB, OH; D. Paxson, NASA Glenn Research Center, Cleveland, OH; C. Stevens, J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH | 1030 hrs<br>AIAA-2016-1201<br>**Development and Testing of a High-Pressure Rotating Detonation Engine for Rocket Applications**<br>D. Stechmann, S. Heister, Purdue University, West Lafayette, IN | 1100 hrs<br>AIAA-2016-1202<br>**Detonation Reignition within a Rotating Detonation Engine**<br>J. Burr, K. Yu, University of Maryland, College Park, College Park, MD | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **256-PC-10** | **Laminar Flames** | | | | | **Harbor C** |
| Chaired by: D. GLAZE, Sandia National Laboratories and P. KOURDIS | | | | | | |
| 0900 hrs<br>AIAA-2016-1203<br>**Major Species Investigation of Non-Premixed Cellular Tubular Flame**<br>C. Hall, R. Pitz, Vanderbilt University, Nashville, TN | 0930 hrs<br>AIAA-2016-1204<br>**Partially premixed hydrogen-air cellular flames in a tubular burner**<br>D. Tinker, C. Hall, R. Pitz, Vanderbilt University, Nashville, TN | 1000 hrs<br>AIAA-2016-1205<br>**The Dynamics of Premixed Flames in Long Narrow Channels**<br>M. Matalon, University of Illinois, Urbana-Champaign, Urbana, IL; V. Kurdyumov, Department of Energy, Madrid, Spain | 1030 hrs<br>AIAA-2016-1206<br>**The Effect of Stretch and Heat Loss on the Anchoring and Response to Acoustic Forcing of a Bluff Body Stabilized Lean Premixed Flame**<br>D. Michaels, K. Kedia, A. Ghoniem, Massachusetts Institute of Technology, Cambridge, MA | 1100 hrs<br>AIAA-2016-1207<br>**Flame Dynamics and Structures of Partially Premixed Cool Flames**<br>C. Reuter, S. Won, Y. Ju, Princeton University, Princeton, NJ | 1130 hrs<br>AIAA-2016-1208<br>**A Smart CSP Method and Correlated Dynamic Adaptive Chemistry and Transport Algorithm for Computationally Efficient Modeling with A Detailed Mechanism**<br>W. Sun, Y. Ju, Princeton University, Princeton, NJ | 1200 hrs<br>AIAA-2016-1209<br>**Analysis of the Ignition of a Combustible Fuel Spray-Oxidant Mixture**<br>J. Greenberg, G. Kats, Technion–Israel Institute of Technology, Haifa, Israel |

| Wednesday, 6 January 2016 | | | | | | |
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| **257-PDL-7** | **ns-DBD Plasma Actuator** | | | | | **Ocean Beach** |
| Chaired by: S. ROY, University of Florida | | | | | | |
| 0900 hrs<br>AIAA-2016-1210<br>**Pulse-to-Pulse Coupling for Ignition in Cross-Flow Using Nanosecond-Pulsed High-Frequency Discharge**<br>T. Ombrello, Air Force Research Laboratory, Wright-Patterson AFB, OH; J. Lefkowitz, Princeton University, Princeton, NJ | 0930 hrs<br>AIAA-2016-1211<br>**Measurements and kinetic modeling of OH and H number densities in nanosecond pulse discharges in $C_xH_y$-$O_2$-Ar and $C_xH_y$-air mixtures**<br>C. Winters, A. Chernukho, Z. Eckert, I. Adamovich, Ohio State University, Columbus, OH | 1000 hrs<br>AIAA-2016-1212<br>**Characterization of efficiency of energy deposition of a ns-DBD plasma actuator**<br>J. Van den Broecke, G. Correale, F. Avallone, Delft University of Technology, Delft, The Netherlands | 1030 hrs<br>AIAA-2016-1213<br>**Kinetics of excited species at high specific energy deposition: quenching by electrons in the afterglow of a nanosecond capillary discharge**<br>N. Lepikhin, A. Klochko, National Center for Scientific Research (CNRS), Palaiseau, France; N. Popov, Moscow State University, Moscow, Russia ; S. Starikovskaia, National Center for Scientific Research (CNRS), Palaiseau, France | 1100 hrs<br>AIAA-2016-1214<br>**Fluid Motion Induced by Spark Plasma: Development of Particle Image Velocimetry Measurements**<br>B. Singh, L. Rajendran, Purdue University, West Lafayette, IN; M. Giarra, Virginia Polytechnic Institute and State University, Blacksburg, VA; S. Bane, P. Vlachos, Purdue University, West Lafayette, IN | 1130 hrs<br>AIAA-2016-1215<br>**CARS / 4-Wave Mixing Measurements of Electric Field in AC Dielectric Barrier Discharges Overlapped with Nanosecond Duration Voltage Pulses**<br>B. Goldberg, I. Adamovich, W. Lempert, Ohio State University, Columbus, OH | |

| Wednesday, 6 January 2016 | | | | | | |
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| **258-SCS-3** | **Spacecraft Membranes, Booms, and Trusses I** | | | | | **Balboa B** |
| Chaired by: B. DAVIS, Roccor LLC and G. GRESCHIK, TentGuild Engineering Co | | | | | | |
| 0900 hrs<br>AIAA-2016-1216<br>**Membrane Spin-Up in a Normal Gravity Field: Experiments and Simulations**<br>M. Delapierre, S. Pellegrino, California Institute of Technology, Pasadena, CA | 0930 hrs<br>AIAA-2016-1217<br>**Membrane Space Structure with Sterical Support of Booms and Cables**<br>A. Torisaka, Tokyo Metropolitan University, Hino, Japan; Y. Satoh, Self, Shinjyuku, Japan; T. Akita, Chiba Institute of Technology, Narashino, Japan; M. Natori, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; H. Yamakawa, T. Miyashita, Waseda University, Shinjyuku, Japan | 1000 hrs<br>AIAA-2016-1218<br>**Windmill Torque Estimation of Spin-type Solar Power Sail with Shape Control**<br>J. Kikuchi, T. Chujo, University of Tokyo, Bunkyo, Japan; Y. Shirasawa, Japan Aerospace Exploration Agency (JAXA), Tsukuba, Japan; O. Mori, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan | 1030 hrs<br>AIAA-2016-1219<br>**Shape Estimation and Design Methods for Membrane Structures to Achieve Appropriate Flatness**<br>T. Nishizawa, H. Sakamoto, Tokyo Institute of Technology, Tokyo, Japan | 1100 hrs<br>AIAA-2016-1220<br>**Mechanical Development of a Novel Inflatable and Rigidizable Structure**<br>G. Secheli, A. Viquerat, G. Aglietti, University of Surrey, Guildford, United Kingdom | 1130 hrs<br>AIAA-2016-1221<br>**Viscoelastic Effects in Metal-Polymer Laminate Inflatable Structures**<br>A. Viquerat, University of Surrey, Guildford, United Kingdom; M. Schenk, University of Bristol, Bristol, United Kingdom | |

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| **259-SD-7** | **Dynamics, Feedback Control, and Aeroservoelasticity II** | | | | | **Balboa C** |
| Chaired by: M. PATIL, Virginia Tech and A. GREWAL, National Research Council Canada | | | | | | |
| 0900 hrs<br>AIAA-2016-1222<br>**Model Order Reduction of Aeroservoelastic Model of Flexible Aircraft**<br>Y. Wang, H. Song, K. Pant, CFD Research Corporation, Huntsville, AL; M. Brenner, P. Suh, NASA Armstrong Flight Research Center, Edwards, CA | 0930 hrs<br>AIAA-2016-1223<br>**Optimal manoeuvres with very flexible wings**<br>S. Maraniello, R. Simpson, R. Palacios, Imperial College London, London, United Kingdom | 1000 hrs<br>AIAA-2016-1224<br>**Alternative Unsteady Aerodynamic Uncertainty Modeling Approaches for Aeroservoelastic Reliability Analysis**<br>E. Livne, S. Wu, University of Washington, Seattle, Seattle, WA | 1030 hrs<br>AIAA-2016-1225<br>**Nonlinear Passive Control Strategies for Suppression of Transonic Flutter**<br>Z. Yan, S. Ragab, M. Hajj, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1100 hrs<br>AIAA-2016-1226<br>**Aeroelastic responses identification of a high-aspect-ratio flexible wing model and its active flutter suppression strategy**<br>Z. Lu, Y. Cui, D. Schneider, Z. Zhao, X. Chen, K. Lai, National University of Singapore, Singapore, Singapore; et al. | 1130 hrs<br>AIAA-2016-1227<br>**Active Flutter Suppression Combining the Receptance Method and Flutter Margin**<br>Z. Wu, Beihang University, Beijing, China; J. Cooper, University of Bristol, Bristol, United Kingdom | 1200 hrs<br>AIAA-2016-1228<br>**Active Vibration Control Applications for Adaptive Aircraft Wings Modelled as Thin-Walled Composite Beams**<br>K. Yildiz, Pennsylvania State University, State College, PA; S. Eken, M. Kaya, Istanbul Technical University, Istanbul, Turkey |

| Wednesday, 6 January 2016 | | | | | | |
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| **260-SEN-1** | **Novel Sensor Systems and Sensing Techniques I** | | | | | **Regatta C** |
| Chaired by: D. ACCARDO, University of Naples | | | | | | |
| 0900 hrs<br>AIAA-2016-1229<br>**Acceleration and Velocity Sensing from Measured Strain**<br>C. Pak, R. Truax, NASA Armstrong Flight Research Center, Edwards, CA | 0930 hrs<br>AIAA-2016-1230<br>**Laser Anemometer for Autonomous Systems Operations**<br>C. Font, T. Apker, F. Santiago, Naval Research Laboratory, Washington, D.C. | 1000 hrs<br>AIAA-2016-1231<br>**Characterization of multiple damage sites in composites using reduced order piezoelectric sensor array**<br>V. Nethala, University of South Carolina, Columbia, Columbia, SC | | | | |

| Wednesday, 6 January 2016 | | |
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| **261-SOF-5/UMS-5/IS-6**<br>**0900 - 1230 hrs** | **Assurance of Autonomy Symposium I** | **Coronado A** |

Describing Autonomy for System Assurance

In this session, we survey the current state of assurance in autonomous systems, as well as provide a commentary on the state of the art in terms of practices used to achieve assured autonomy. Topics that will be addressed include a discussion of this year's Workshop on Certification of Non-Deterministic Systems, the recent NRC report on Autonomy Research for Civil Aviation, along with discourse on current practices in the UAS industry as well as at NASA's Autonomy Incubator.

We begin with a panel discussion to explore these areas, via an interactive Q&A session with the audience. The audience questions will be used to drive and derive directions for investigation that will be captured by the moderators in the report-out. This will be followed by several example lightning-fast (5-minute) talks on new ideas for describing and generating requirements for autonomous systems.

Panelists:

**Danette Allen**
NASA Langley Research Center

**Andy Thurling**
AeroVironment

**Andy Lacher**
MITRE Corporation

**Ella Atkins**
University of Michigan

**Lael Rudd**
Northrop Grumman Corporation

Lightning-fast Talks:

**Jack Ryan**
NASA Armstrong Flight Research Center

**Corey Ippolito**
NASA Ames Research Center

**Devesh Bhatt**
Honeywell International, Inc.

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| **262-STR-8** | **Design, Test and Analysis of Composite Structures I** | | | | | **La Jolla A** |
| Chaired by: A. SELVARATHINAM, Lockheed Martin Corporation and A. NAJAFI, ANSYS, Inc. | | | | | | |
| 0900 hrs<br>AIAA-2016-1232<br>**Role of FEA, Closed-Form, and Empirical Models in Certifying Aircraft Composite Structures**<br>A. Selvarathinam, C. Rousseau, S. Engelstad, L. Flansburg, Lockheed Martin Corporation, Fort Worth, TX | 0930 hrs<br>AIAA-2016-1233<br>**Extension of Automated 3D Digital Reconstruction to Multi-Directional Fiber Reinforced Composite Microstructures**<br>W. Whitacre, Draper Laboratory, Cambridge, MA; M. Czabaj, University of Utah, Salt Lake City, Salt Lake City, UT | 1000 hrs<br>AIAA-2016-1234<br>**Determining Effective Interface Fracture Properties of 3D Fiber Reinforced Foam Core Sandwich Structures**<br>Z. Kier, The Aerospace Corporation, El Segundo, CA; A. Waas, University of Washington, Seattle, Seattle, WA | 1030 hrs<br>AIAA-2016-1235<br>**Approach of Interlaminar Characterization for Thick Aircraft Composite Structures**<br>M. Gurvich, P. Clavette, United Technologies Corporation, East Hartford, CT; M. Robeson, Army Aviation and Missile Research Development and Engineering Center, Fort Eustis, VA | 1100 hrs<br>AIAA-2016-1236<br>**Impact Response of Woven Composites with Interlaminar Reinforcement**<br>A. Castellanos, S. Islam, S. Quevedo, M. Shuvo, Y. Lin, P. Prabhakar, University of Texas, El Paso, El Paso, TX | 1130 hrs<br>AIAA-2016-1237<br>**Hybrid Textile Composites as Potential Cryogenic Tank Materials**<br>M. Islam, R. Avila, A. Castellanos, P. Prabhakar, University of Texas, El Paso, El Paso, TX | |

| Wednesday, 6 January 2016 | | | | | | |
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| **263-STR-9** | **Other Topics in Structures** | | | | | **La Jolla B** |
| Chaired by: I. RAJU, NASA-Langley Research Center and S. RUSSELL, Triumph Aerostructures | | | | | | |
| 0900 hrs<br>AIAA-2016-1238<br>**An Open Source Reverse Engineering Workflow: Geometry to Optimization**<br>P. Gustafson, A. Geeslin, J. Jastifer, Western Michigan University, Kalamazoo, MI | 0930 hrs<br>AIAA-2016-1239<br>**The Effects of Reducing the Structural Mass of the Transit Habitat on the Cryogenic Propellant Required for a Human Phobos Mission**<br>J. Zipay, NASA Johnson Space Center, Houston, TX | 1000 hrs<br>AIAA-2016-1240<br>**Simple Test Functions in Meshless Local Petrov-Galerkin Methods**<br>I. Raju, NASA Langley Research Center, Hampton, VA | 1030 hrs<br>AIAA-2016-1241<br>**Thermally-Driven Morphing with High Temperature Composites**<br>E. Eckstein, University of Bristol, Bristol, United Kingdom; M. Halbig, NASA Glenn Research Center, Cleveland, OH; P. Weaver, University of Bristol, Bristol, United Kingdom | 1100 hrs<br>AIAA-2016-1242<br>**Nonlinear Modelling of Axially Deformable Elastica based on Hyperelasticity**<br>F. Jiang, S. Tian, W. Yu, Purdue University, West Lafayette, IN | | |



| Wednesday, 6 January 2016 | | | | | | |
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| **264-SUR-1** | **Air and Space Survivability I** | | | | | **Old Town A** |
| Chaired by: J. RIMOLI, Georgia Institute of Technology and E. FAHRENTHOLD, University of Texas | | | | | | |
| 0900 hrs<br>AIAA-2016-1243<br>**Crew Compartment Fire Survivability**<br>A. Goss, 96th Test Group, Wright-Patterson AFB, OH | 0930 hrs<br>AIAA-2016-1244<br>**Characterization of Hydrodynamic Ram Cavity Dynamics to Transient Spray**<br>A. Lingenfelter, D. Liu, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1000 hrs<br>AIAA-2016-1245<br>**Composition Characterization of Cavity Consisting of Multiple Fluids**<br>A. Lingenfelter, D. Liu, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1030 hrs<br>AIAA-2016-1246<br>**Wing Design Utilizing Topology Optimization and Additive Manufacturing**<br>D. Walker, D. Liu, A. Jennings, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1100 hrs<br>AIAA-2016-1247<br>**Topology Optimization and CFD Analysis of a Hypersonic Vehicle Nose Cone**<br>K. Liu, D. Stelzer, Ohio State University, Columbus, OH; A. Williamson, D. Liu, Air Force Institute of Technology, Wright-Patterson AFB, OH; A. Jennings, Raytheon Company, Tucson, AZ | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **265-TP-7** | **Aerothermodynamics II** | | | | | **Harbor G** |
| Chaired by: K. EDQUIST, NASA Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-1248<br>**Computational Study of Non-Equilibrium Effects on Hypersonic Boundary-Layer Transition**<br>X. Wang, E. Josyula, Air Force Research Laboratory, Wright-Patterson AFB, OH | 0930 hrs<br>AIAA-2016-1249<br>**Simulation of O2-N Collisions on ab-initio Potential Energy Surfaces**<br>D. Andrienko, I. Boyd, University of Michigan, Ann Arbor, Ann Arbor, MI | 1000 hrs<br>AIAA-2016-1250<br>**Thermochemical Nonequilibrium CFD Modeling for Hypersonic Flows Containing Oxygen**<br>K. Neitzel, D. Andrienko, I. Boyd, University of Michigan, Ann Arbor, Ann Arbor, MI | 1030 hrs<br>AIAA-2016-1251<br>**Analysis of the Temperature Ratio Effects on the Flow Properties of the Low Reynolds and High Mach number Flow around a Sphere**<br>T. Nagata, Tokai University, Hiratsuka, Japan; T. Nonomura, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; S. Takahashi, Y. Mizuno, K. Fukuda, Tokai University, Hiratsuka, Japan | 1100 hrs<br>AIAA-2016-1252<br>**The Effects of Chemical Nonequilibrium and Surface Catalyticity on Aerothermodynamic Characteristics of Hypersonic Vehicles**<br>X. Chen, F. Chen, S. Zhang, H. Liu, Shanghai Jiao Tong University, Shanghai, China | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **266-UMS-6** | **Unmanned Systems: Novel Platforms and Controls** | | | | | **Regatta B** |
| Chaired by: B. ARGROW, University of Colorado Boulder and R. CHRISTIANSEN, Sierra Lobo, Inc. | | | | | | |
| 0900 hrs<br>AIAA-2016-1253<br>**Real Time Detection And Tracking Of Visual Features For Aircraft Guidance**<br>H. Chaudhry, E. Smith, K. Kochersberger, Virginia Polytechnic Institute and State University, Blacksburg, VA | 0930 hrs<br>AIAA-2016-1254<br>**Design and Control of a Novel Tiltrotor Platform**<br>J. Kim, D. Choi, University of Kansas, Lawrence, Lawrence, KS | 1000 hrs<br>AIAA-2016-1255<br>**Development of a 20 gram Cycloidal-Rotor-Based Micro Air Vehicle**<br>C. Runco, M. Benedict, Texas A&M University, College Station, TX | 1030 hrs<br>AIAA-2016-1256<br>**Collaboration between Multiple Unmanned Vehicles for Increased Mission Efficiency**<br>S. Bhandari, R. Demonteverde, T. Cecil, E. Ito, A. Phan, O. Dadian, California Polytechnic State University, Pomona, CA; et al. | | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **267-WE-5** | **Wind Energy: Wind Turbine Aerodynamics Modeling II** | | | | | **Harbor H** |
| Chaired by: J. BRASSEUR, Penn State University and K. WETZEL, Wetzel Engineering | | | | | | |
| 0900 hrs<br>AIAA-2016-1257<br>**Development of Free Vortex Wake Model for Wind Turbine Aerodynamics under Yaw Condition**<br>H. Abedi, L. Davidson, Chalmers University of Technology, Göteborg, Sweden; S. Voutsinas, National Technical University of Athens, Athens, Greece | 0930 hrs<br>AIAA-2016-1258<br>**A Novel Approach for Staggered Fluid-Structure Interaction Simulation of Shape-Adaptive Airfoils for Wind Turbine Rotor Blades**<br>I. Ahmed, M. Lawerenz, University of Kassel, Kassel, Germany | 1000 hrs<br>AIAA-2016-1259<br>**Experimental investigation of asymmetric steamwise vortices in a turbulent boundary layer**<br>D. Baldacchino, D. Ragni, C. Simao Ferreira, G. van Bussel, Delft University of Technology, Delft, The Netherlands | 1030 hrs<br>AIAA-2016-1260<br>**Improved Free Vortex Wake Models Of Floating Offshore Wind Turbines**<br>E. Gaertner, S. Liu, M. Lackner, University of Massachusetts, Amherst, Amherst, MA | 1100 hrs<br>AIAA-2016-1261<br>**Wind Farm Large-Eddy Simulations on Very Coarse Grid Resolutions using an Actuator Line Model**<br>L. Martinez, C. Meneveau, R. Stevens, Johns Hopkins University, Baltimore, MD | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **268-WE-6** | **Wind Energy: Rotor Design** | | | | | **Harbor I** |
| Chaired by: D. GRIFFITH | | | | | | |
| 0900 hrs<br>AIAA-2016-1262<br>**Aeroelastic Optimization of a 10 MW Wind Turbine Blade with Active Trailing Edge Flaps**<br>A. Barlas, C. Tibaldi, F. Zahle, H. Madsen, Technical University of Denmark, Roskilde, Denmark | 0930 hrs<br>AIAA-2016-1263<br>**Blade Element Momentum Based Study for Active and Passive Microjets Systems on the NREL 5-MW Turbine**<br>O. Hurley, R. Chow, M. Blaylock, C. Van Dam, University of California, Davis, Davis, CA | 1000 hrs<br>AIAA-2016-1264<br>**Blade Load Reduction for a 13 MW Downwind Pre-Aligned Rotor**<br>C. Qin, E. Loth, University of Virginia, Charlottesville, Charlottesville, VA; S. Lee, P. Moriarty, National Renewable Energy Laboratory, Golden, CO | 1030 hrs<br>AIAA-2016-1265<br>**Direct and Surrogate-Based Optimization of Dual-Rotor Wind Turbines**<br>A. Thelen, L. Leifsson, A. Sharma, Iowa State University, Ames, IA; S. Koziel, Reykjavik University, Reykjavik, Iceland | 1100 hrs<br>AIAA-2016-1266<br>**Optimal Aerodynamic Design of a Biplane Wind Turbine Blade**<br>P. Chiu, R. Wirz, University of California, Los Angeles, Los Angeles, CA | | |

| Wednesday, 6 January 2016 | | |
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| **269-PANEL-8**<br>**0930 - 1130 hrs** | **Wednesday Morning Forum 360**<br><br>**Additive Manufacturing – Applications and Opportunities for the Aerospace Industry** | **Seaport F-G** |

Moderator: Robert Yancey, VP Aerospace & Composites, Altair Engineering, Inc.

Panelists:

**Franck Mouriaux**
General Manager Structures, RUAG Schweiz AG
RUAG Space

**Chauncey Wu**
Structural Mechanics and Concepts Branch
NASA Langley Research Center

**Jason Dunn**
Co-Founder and CTO
Made In Space

**Greg Arend**
Additive Manufacturing Development Leader
United Launch Alliance

| Wednesday, 6 January 2016 | | |
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| 270-LEC-7<br>1000 - 1100 hrs | Aviation Week Annual Workforce Survey Results | Seaport H |

Moderator: Carole Rickard Hedden, Executive Editorial Director, Aviation Week Exceutive Intelligence

Panelists:

**Jim Adams**
Partner
PwC/Strategy&

**Clarke Havener**
Global Sector Leader A&D
Korn Ferry

**Lauren Smith**
Concept Development Engineer
Northrop Grumman Aerospace Systems

| Wednesday, 6 January 2016 | | |
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| 271-LUNCH-3<br>1230 - 1400 hrs | Luncheon in the Exposition Hall | Exposition Hall |

| Wednesday, 6 January 2016 | | | | | | |
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| 272-AA-6 | Aeroacoustics - Fan, Rotor, and Airframe Noise | | | | | Nautical |
| Chaired by: J. MENDOZA, United Technologies Research Center and C. ROYALTY, Honeywell | | | | | | |
| 1400 hrs<br>AIAA-2016-1267<br>**Evaluation of Skin Friction Drag for Liner Applications in Aircraft**<br>C. Gerhold, National Institute of Aerospace, Hampton, VA; M. Brown, NASA Langley Research Center, Hampton, VA; C. Jasinski, University of Notre Dame, Notre Dame, IN | 1430 hrs<br>AIAA-2016-1268<br>**Hybrid Feedforward Feedback Noise Control at Remote Locations**<br>J. Bean, C. Fuller, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1500 hrs<br>AIAA-2016-1269<br>**Broadband Noise from a Rotor at an Angle to the Mean Flow**<br>S. Glegg, J. Grant, Florida Atlantic University, Boca Raton, FL; D. Wisda, H. Murray, W. Alexander, W. Devenport, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1530 hrs<br>AIAA-2016-1270<br>**Rotor Broadband Noise Due to Surface Roughness during Ice Accretion**<br>B. Cheng, Y. Han, K. Brentner, J. Palacios, P. Morris, Pennsylvania State University, University Park, PA | 1600 hrs<br>AIAA-2016-1271<br>**Isolated Open Rotor Noise Prediction Assessment Using the F31A31 Historical Blade Set**<br>D. Nark, W. Jones, D. Boyd, N. Zawodny, NASA Langley Research Center, Hampton, VA | 1630 hrs<br>AIAA-2016-1272<br>**Efficient Multidisciplinary Optimization of CROR with Time-Spectral Aeroelastics/Aeroacoustics Analysis**<br>S. Yi, D. Lee, Korea Advanced Institute of Science and Technology, Daejeon, South Korea ; S. Choi, D. Im, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1700 hrs<br>AIAA-2016-1273<br>**Landing Gear Noise Prediction and Analysis for Tube-And-Wing and Hybrid-Wing-Body Aircraft**<br>Y. Guo, NEAT Consulting, Seal Beach, CA; C. Burley, R. Thomas, NASA Langley Research Center, Hampton, VA |

| Wednesday, 6 January 2016 | | | | | | |
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| 273-ACD-6 | Aircraft Design Tools | | | | | Bankers Hill |
| Chaired by: P. RAJ, Virginia Polytechnic Institute and State University and W. ANEMAAT, DARcorporation | | | | | | |
| 1400 hrs<br>AIAA-2016-1274<br>**Three-Dimensional Modeling of Aircraft High-Lift Components with Vehicle Sketch Pad**<br>E. Olson, NASA Langley Research Center, Hampton, VA | 1430 hrs<br>AIAA-2016-1275<br>**SUAVE: An Open-Source Environment for Conceptual Vehicle Design and Optimization**<br>E. Botero, A. Wendorff, T. MacDonald, A. Variyar, J. Vegh, T. Lukaczyk, Stanford University, Stanford, CA; et al. | 1500 hrs<br>AIAA-2016-1276<br>**A Conceptual Design Framework for Performance, Life-Cycle Cost, and Safety Evaluation of Suborbital Vehicles**<br>C. Frank, M. Atanian, O. Pinon-Fischer, D. Mavris, Georgia Institute of Technology, Atlanta, GA | 1530 hrs<br>AIAA-2016-1277<br>**RDS$^{win}$ : Seamlessly-Integrated Aircraft Conceptual Design for Students & Professionals**<br>D. Raymer, Conceptual Research Corporation, Playa del Rey, CA | 1600 hrs<br>AIAA-2016-1278<br>**Object-Oriented Aircraft Mission Analysis Using NPSS**<br>S. Coogan, Southwest Research Institute, San Antonio, TX | 1630 hrs<br>AIAA-2016-1279<br>**Development of a Wave Drag Prediction Method for the Conceptual Design Phase**<br>J. Vargas-Jimenez, R. Vos, Delft University of Technology, Delft, The Netherlands | |

| Wednesday, 6 January 2016 | | | | | | |
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| 274-ACD-7 | Transport Aircraft Design II | | | | | Cortez Hill A |
| Chaired by: E. DIGIROLAMO, Lockheed Martin Aeronautics and D. CARTER, Air Force Research Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-1280<br>**Improved Field Performance through Regulatory Changes to Enable Speed Scheduled Reverse Thrust**<br>D. Smith, T. Takahashi, Arizona State University, Tempe, AZ | 1430 hrs<br>AIAA-2016-1281<br>**Assessing the Effect of Decreased Longitudinal Stability on Aircraft Size and Performance**<br>Q. Jansen, R. Vos, Delft University of Technology, Delft, The Netherlands | 1500 hrs<br>AIAA-2016-1282<br>**Application of a low fineness ratio fuselage to an airliner configuration**<br>M. Kruger, R. Huyssen, L. Smith, J. Meyer, University of Pretoria, Pretoria, South Africa | 1530 hrs<br>AIAA-2016-1283<br>**Seat Capacity Selection for an Advanced Short-Haul Aircraft Design**<br>T. Marien, NASA Langley Research Center, Hampton, VA | 1600 hrs<br>AIAA-2016-1284<br>**PAXelerate - An Open Source Passenger Flow Simulation Framework for Advanced Aircraft Cabin Layouts**<br>M. Schmidt, Munich Aerospace e.V., Ottobrunn, Germany; M. Engelmann, T. Brügge-Zobel, M. Hornung, Bauhaus Luftfahrt e.V., Ottobrunn, Germany; M. Glas, IABG, Ottobrunn, Germany | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **275-AFM-9** | **Aircraft Flight Dynamics, Handling Qualities, and Performance II** | | | | | **Harbor A** |
| Chaired by: D. MURRI, NASA Engineering and Safety Center and K. SHWEYK, Boeing Engineering Operations & Technology | | | | | | |
| 1400 hrs<br>AIAA-2016-1285<br>**The Utilization of Wingtip Vortices in Formation Flight Aerodynamics for Unmanned Arial Vehicles**<br>N. Saneholtz, S. Kasper, T. Burke, J. Rapski, Ohio State University, Columbus, OH | 1430 hrs<br>AIAA-2016-1286<br>**Trajectory Scripts for Aircraft and Spacecraft Flight path Analysis**<br>D. Raymer, Conceptual Research Corporation, Playa del Rey, CA | 1500 hrs<br>AIAA-2016-1287<br>**Linear Approximation of Flapping Wing Flight Dynamics of a Ross's Goose**<br>E. Bodlak, M. Dessouki, M. Fiser, M. Mitchener, University of Kansas, Lawrence, KS | 1530 hrs<br>AIAA-2016-1288<br>**Comparisons between Avian and Unmanned Aerial Vehicle Approach to Thermal Updraft Detection**<br>C. Pinkerman, T. O'Connell, A. Arena, Oklahoma State University, Stillwater, OK | 1600 hrs<br>AIAA-2016-1289<br>**Dynamic Modeling and Analysis of a VTOL Freewing Concept**<br>S. Haviland, D. Bershadsky, E. Johnson, Georgia Institute of Technology, Atlanta, GA | 1630 hrs<br>AIAA-2016-1290<br>**Effects of Basing UAS DAA Requirements on Intruder Speeds Lower Than the Statute Speed Limit**<br>D. Jack, K. Hoffler, S. Johnson, Adaptive Aerospace Group, Inc., Hampton, VA | 1700 hrs<br>AIAA-2016-1291<br>**Aircraft Navigation with Uncertain Aerodynamics**<br>C. Ashokkumar, G. York , U.S. Air Force Academy, Colorado Springs, CO |

| Wednesday, 6 January 2016 | | | | | | |
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| **276-AMT-6/PC-11/PDL-8** | **Special Walter Lempert Memorial Session II (Invited)** | | | | | **Harbor D** |
| Chaired by: S. BERESH, Sandia National Laboratories and T. MEYER, Purdue University | | | | | | |
| 1400 hrs<br>Oral Presentation<br>**Walter's Legacy from his Decade at Princeton**<br>R. Miles, Princeton University, Princeton, NJ | 1430 hrs<br>Oral Presentation<br>**Walter's contributions to NASA: the early years through 1 MHz PLIF Imaging**<br>N. Jiang, Air Force Research Laboratory, Wright-Patterson AFB, OH; P. Danehy, NASA Langley Research Center, Hampton, VA | 1500 hrs<br>Oral Presentation<br>**Burst-Mode Diagnostics for Combustion Species: Evolution to 4D Imaging and Nonlinear Spectroscopy**<br>T. Meyer, Iowa State University, Ames, IA; J. Gord, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1530 hrs<br>Oral Presentation<br>**Flow Diagnostics for Exploring Physics of Complex Flows**<br>M. Samimy, Ohio State University, Columbus, OH | 1600 hrs<br>Oral Presentation<br>**Recent Developments in Rayleigh Scattering and Filtered Rayleigh Scattering Imaging in Gas-Phase, Multi-Phase, and Reacting Flows**<br>J. Sutton, Ohio State University, Columbus, OH | 1630 hrs<br>Oral Presentation<br>**CARS Measurements of Electric-Field: Walter's Contributions at Sandia**<br>S. Kearney, Sandia National Laboratories, Albuquerque, NM | 1700 hrs<br>Oral Presentation<br>**Walter Lempert's contributions to graduate research and education**<br>B. Thurow, Auburn University, Auburn, AL |

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| **277-APA-27** | **Special Session: Aerodynamic Design Optimization Benchmark Problems I** | | | | | **Coronado D** |
| Chaired by: L. LEIFSSON, Iowa State University and S. LEDOUX, Boeing Engineering Operations & Technology | | | | | | |
| 1400 hrs<br>AIAA-2016-1292<br>**Progress in Aerodynamic Shape Optimization Based on the Reynolds-Averaged Navier-Stokes Equations**<br>D. Koo, D. Zingg, University of Toronto, Toronto, Canada | 1430 hrs<br>AIAA-2016-1293<br>**Gradient-Based Optimization of CRM Wing-alone and Wing-body-tail Configurations by RANS Adjoint Technique**<br>M. Meheut, A. Dumont, G. Carrier, J. Peter, ONERA, Meudon, France | 1500 hrs<br>AIAA-2016-1294<br>**Aerodynamic Shape Optimization of the CRM Configuration Including Buffet-Onset Conditions**<br>G. Kenway, J. Martins, University of Michigan, Ann Arbor, Ann Arbor, MI | 1530 hrs<br>AIAA-2016-1295<br>**Two-Dimensional Adjoint-Based Transonic Aerodynamic Design on Unstructured Meshes**<br>E. Fabiano, D. Mavriplis, University of Wyoming, Laramie, Laramie, WY | 1600 hrs<br>AIAA-2016-1296<br>**Comparitive Study of Two Optimization Frameworks Applied to Case III: Induced-Drag Minimization**<br>A. Rizzi, M. Zhang, Royal Institute of Technology (KTH), Stockholm, Sweden; S. Nadarajah, McGill University, Montréal, Canada; J. Vos, CFS Engineering, Lausanne, Switzerland | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **278-APA-28** | **Special Session: CREATE-AV HPC Multiphysics Applications of Full-up Air Vehicles III** | | | | | **Coronado E** |
| Chaired by: N. HARIHARAN, CREATE-AV and J. FORSYTHE | | | | | | |
| 1400 hrs<br>AIAA-2016-1297<br>**Collaborating with Kestrel**<br>T. Tuckey, R. McNally, CREATE AV Team, Eglin AFB, FL; S. Adamec, University of Alabama, Birmingham, Birmingham, AL | 1430 hrs<br>AIAA-2016-1298<br>**Modularization of FUN3D as a CREATE-AV Helios Near-body Solver**<br>R. Jain, Army Research Development and Engineering Center, Moffett Field, CA; R. Biedron, W. Jones, E. Lee-Rausch, NASA Langley Research Center, Hampton, VA | 1500 hrs<br>AIAA-2016-1299<br>**Unstructured Sliding Interface Boundaries in Kestrel**<br>D. McDaniel, R. Nichols, J. Klepper, CREATE Kestrel Team, Arnold AFB, TN | 1530 hrs<br>AIAA-2016-1300<br>**Entropy solution at concave corners and ridges**<br>R. Aubry, B. Karamete, E. Mestreau, S. Dey, Naval Research Laboratory, Washington, D.C. | 1600 hrs<br>AIAA-2016-1301<br>**A Novel Double Link Structure (DLS) with Applications to Computational Engineering and Design**<br>B. Karamete, R. Aubry, E. Mestreau, S. Dey, Naval Research Laboratory, Washington, D.C. | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **279-APA-29** | **Flow Control Applications & Demonstrations II** | | | | | **Americas Cup C** |
| Chaired by: D. HUNSAKER, Blucraft, LLC | | | | | | |
| 1400 hrs<br>AIAA-2016-1302<br>**The Development and Demonstration of a Plasma Flow Control System on a 20 kW Wind Turbine**<br>J. Cooney, C. Szlatenyi, Navatek, Ltd., South Kingstown, RI; N. Fine, Self, North Kingstown, RI | 1430 hrs<br>AIAA-2016-1303<br>**Active Flow Control at Low Reynolds Numbers by Periodic Airfoil Morphing**<br>G. Jones, M. Santer, G. Papadakis, Imperial College London, London, United Kingdom; M. Debiasi, National University of Singapore, Singapore, Singapore | 1500 hrs<br>AIAA-2016-1304<br>**Optimization of Vane-Type Vortex Generators for Tiltrotor Wings using Computational Fluid Dynamics**<br>R. Bevan, D. Poole, C. Allen, T. Rendall, University of Bristol, Bristol, United Kingdom | 1530 hrs<br>AIAA-2016-1305<br>**Enhancement of Engine Onflow Conditions Using Vortex Generators within Curved Intake Channels**<br>M. Ruetten, German Aerospace Center (DLR), Göttingen, Germany | 1600 hrs<br>AIAA-2016-1306<br>**The Airfoil Thickness Effect on Wavy Leading Edge Performance**<br>B. Mattos, Technological Institute of Aeronautics (ITA), São José dos Campos, Brazil; J. Meneghini, University of São Paulo, São Paulo, Brazil; B. Padilha, A. de Paula, Technological Institute of Aeronautics (ITA), São José dos Campos, Brazil | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **280-APA-30** | **Unsteady Aerodynamics II** | | | | | **Americas Cup D** |
| Chaired by: D. O'BRIEN, US Army RDECOM and J. FARNSWORTH, University of Colorado Boulder | | | | | | |
| 1400 hrs<br>AIAA-2016-1307<br>**A Variational Principle for Unsteady Compressible Flow**<br>Y. Hwang, Z. Sotoudeh, Rensselaer Polytechnic Institute, Troy, NY | 1430 hrs<br>AIAA-2016-1308<br>**Effects of Upstream Disturbances on a Pitching NACA0012 Airfoil**<br>B. Merrill, Y. Peet, Arizona State University, Tempe, AZ | 1500 hrs<br>AIAA-2016-1309<br>**Characterisation of Buffet on a Civil Aircraft Wing**<br>S. Lawson, D. Greenwell, Aircraft Research Association Ltd., Bedford, United Kingdom; M. Quinn, University of Manchester, Manchester, United Kingdom | 1530 hrs<br>AIAA-2016-1310<br>**Transonic Buffet Simulation over Supercritical Airfoil by Unsteady-FaSTAR Code**<br>T. Ishida, K. Ishiko, A. Hashimoto, T. Aoyama, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; K. Takekawa, Ryoyu Systems Company, Ltd., Nagoya, Japan | 1600 hrs<br>AIAA-2016-1311<br>**Modified Spectral Operators for Time-Collocation and Time-Spectral Solvers**<br>R. Djeddi, K. Ekici, University of Tennessee, Knoxville, Knoxville, TN | 1630 hrs<br>AIAA-2016-1312<br>**Experimental analysis of the flow development on an airfoil harmonically surging into reverse flow**<br>K. Mulleners, University of Maryland, College Park, College Park, MD; M. Ol, Air Force Research Laboratory, Wright-Patterson AFB, OH; A. Jones, University of Maryland, College Park, College Park, MD | |

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| **281-ASC-4** | **Wing Leading and Trailing Edge Morphing** | | | | | **Gaslamp D** |
| Chaired by: G. REICH and F. STRAUB, Boeing Defense, Space & Security | | | | | | |
| 1400 hrs<br>AIAA-2016-1313<br>**Investigation into the Effect of Shape Deviation on Variable Camber Compliant Wing Performance**<br>C. Marks, Air Force Research Laboratory, Wright-Patterson AFB, OH; L. Zientarski, University of Dayton Research Institute, Dayton, OH; J. Joo, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1430 hrs<br>AIAA-2016-1314<br>**Optimization, Design and Structural Testing of a High Deformable Adaptive Wing Leading Edge**<br>A. Rudenko, M. Radestock, H. Monner, German Aerospace Center (DLR), Braunschweig, Germany | 1500 hrs<br>AIAA-2016-1315<br>**Directionally Variable Stiffness to Reduce Actuation Requirement in Airfoil Camber Morphing**<br>M. DiPalma, F. Gandhi, Rensselaer Polytechnic Institute, Troy, NY | 1530 hrs<br>AIAA-2016-1316<br>**Design, Manufacturing and Wind Tunnel Test of a Morphing Wing Based on Compliant Structures**<br>S. Ricci, A. De Gaspari, L. Riccobene, Technical University of Milan, Milan, Italy | 1600 hrs<br>AIAA-2016-1317<br>**Structural Design of an Adaptive Wing Trailing Edge for Enhanced Cruise Performance**<br>A. Concilio, I. Dimino, Italian Aerospace Research Center (CIRA), Capua, Italy; R. Pecora, University of Naples "Federico II", Naples, Italy; M. Ciminello, Italian Aerospace Research Center (CIRA), Capua, Italy | 1630 hrs<br>AIAA-2016-1318<br>**Safety and Reliability Aspects of an Adaptive Trailing Edge Device (ATED)**<br>I. Dimino, A. Concilio, Italian Aerospace Research Center (CIRA), Capua, Italy; R. Pecora, University of Naples "Federico II", Naples, Italy | |

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| **282-DSC-3** | **High Speed Systems** | | | | | **Gaslamp C** |
| Chaired by: N. FALKIEWICZ, MIT Lincoln Laboratory and E. BLADES, ATA Engineering, Inc. | | | | | | |
| 1400 hrs<br>AIAA-2016-1319<br>**Using FUN3D for Aeroelatic, Sonic Boom, and AeroPropulsoServoElastic (APSE) Analyses of a Supersonic Configuration**<br>W. Silva, M. Sanetrik, P. Chwalowski, NASA Langley Research Center, Hampton, VA | 1430 hrs<br>AIAA-2016-1320<br>**Towards an Aero-Propulso-Servo-Elasticity Analysis of a Commercial Supersonic Transport**<br>J. Connolly, NASA Glenn Research Center, Cleveland, OH; P. Chwalowski, M. Sanetrik, J. Carlson, W. Silva, NASA Langley Research Center, Hampton, VA; J. McNamara, Ohio State University, Columbus, OH; et al. | 1500 hrs<br>AIAA-2016-1321<br>**Dynamic Fluid-Thermal-Structural Interaction Effects in Preliminary Design of High Speed Vehicles**<br>Z. Witeof, L. Neergaard, A. Vanderwyst, A. Shelton, C. Martin, Leidos Corporation, Eglin AFB, FL; C. Pasiliao, Air Force Research Laboratory, Eglin AFB, FL | 1530 hrs<br>AIAA-2016-1322<br>**Nonlinear Thermal and Thermoelastic Reduced Order Models of a Hypersonic Vehicle**<br>R. Klock, C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI | 1600 hrs<br>AIAA-2016-1323<br>**Rapid Loads Prediction for Supersonic and Hypersonic Vehicles Using CFD Surrogates**<br>D. Zettl, E. Dreyer, B. Grier, J. McNamara, Ohio State University, Columbus, OH; C. Pasiliao, Air Force Research Laboratory, Eglin AFB, FL | 1630 hrs<br>AIAA-2016-1324<br>**Aeroelastic Modeling and Simulation of Very Flexible Munitions**<br>R. Kitson, C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI | 1700 hrs<br>AIAA-2016-1325<br>**Aeroelastic Control-oriented Modeling of an Air-breathing Hypersonic Vehicle**<br>P. Sudalagunta, C. Sultan, R. Kapania, L. Watson, P. Raj, Virginia Polytechnic Institute and State University, Blacksburg, VA |

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| **283-FD-34** | **CFD: Higher-Order Methods II** | | | | | **Pier** |
| Chaired by: H. LUO, North Carolina State University and A. MAZAHERI, NASA-Langley Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-1326<br>**A fast, implicit discontinuous Galerkin method based on analytical Jacobians for the compressible Navier-Stokes equations**<br>X. Yang, J. Cheng, C. Wang, H. Luo, North Carolina State University, Raleigh, NC; J. Si, Commercial Aircraft Corporation of China, Shanghai, China; A. Pandare, North Carolina State University, Raleigh, NC | 1430 hrs<br>AIAA-2016-1327<br>**Improved Spectral Volume Method ($SV^+$ Method) for Hybrid Unstructured Mesh**<br>Y. Sawaki, Tohoku University, Sendai, Japan; T. Haga, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; Y. Ogino, S. Kawai, K. Sawada, Tohoku University, Sendai, Japan | 1500 hrs<br>AIAA-2016-1328<br>**Investigation of Stabilization Methods for Multi-Dimensional Summation-by-parts Discretizations of the Euler Equations**<br>J. Crean, K. Panda, A. Ashley, J. Hicken, Rensselaer Polytechnic Institute, Troy, NY | 1530 hrs<br>AIAA-2016-1329<br>**Summation-by-Parts Operators with Minimal Dispersion Error for Accurate and Efficient Flow Calculations**<br>V. Linders, Linköping University, Linköping, Sweden; M. Kupiainen, Swedish Meteorological and Hydrological Institute, Norrköping, Sweden; S. Frankel, Y. Delorme, Technion-Israel Institute of Technology, Haifa, Israel; J. Nordstrom, Linköping University, Linköping, Sweden | 1600 hrs<br>AIAA-2016-1330<br>**A Hybrid Reconstructed Discontinuous Galerkin Method for Compressible Flows on Unstructured Grids**<br>J. Cheng, T. Liu, Beihang University, Beijing, China; H. Luo, North Carolina State University, Raleigh, NC | 1630 hrs<br>AIAA-2016-1331<br>**High-Order Residual-Distribution Schemes for Discontinuous Problems on Irregular Triangular Grids**<br>A. Mazaheri, NASA Langley Research Center, Hampton, VA; H. Nishikawa, National Institute of Aerospace, Hampton, VA | 1700 hrs<br>AIAA-2016-1332<br>**Implicit large-eddy simulation of compressible flows using the Interior Embedded Discontinuous Galerkin method**<br>P. Fernandez, C. Nguyen, Massachusetts Institute of Technology, Cambridge, MA; X. Roca, Barcelona Supercomputing Center, Barcelona, Spain; J. Peraire, Massachusetts Institute of Technology, Cambridge, MA |

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| **284-FD-35** | **Discontinuous Galerkin Methods** | | | | | **Harbor F** |
| Chaired by: J. EKATERINARIS, Embry-Riddle Aeronautical University and J. BENEK, Air Force Research Lab AFRL/RQ | | | | | | |
| 1400 hrs<br>AIAA-2016-1333<br>**A High-order Discontinuous Galerkin Method for Unsteady Flow Problems**<br>R. Borker, C. Farhat, R. Tezaur, Stanford University, Stanford, CA | 1430 hrs<br>AIAA-2016-1334<br>**A Direct Discontinuous Galerkin method for the compressible Navier-Stokes equations on arbitrary grids**<br>J. Cheng, Beihang University, Beijing, China; X. Yang, Commercial Aircraft Corporation of China, Shanghai, China; T. Liu, Beihang University, Beijing, China; H. Luo, North Carolina State University, Raleigh, NC | 1500 hrs<br>AIAA-2016-1335<br>**High-Order Cellwise Relaxation Implicit Discontinuous Galerkin Scheme for Unsteady Flow Computations**<br>H. Asada, S. Kawai, K. Sawada, Tohoku University, Sendai, Japan | 1530 hrs<br>AIAA-2016-1336<br>**A dissipative Iter for DG discretizations with subcell discontinuity resolution**<br>K. Panourgias, University of Patras, Rio, Greece; J. Ekaterinaris, Embry-Riddle Aeronautical University, Daytona Beach, FL | 1600 hrs<br>AIAA-2016-1337<br>**Discontinuous Galerkin for Advection with Interface-Centered Reconstruction**<br>L. Khieu, Institute for Computational Science and Technology, Ho Chi Minh, Viet Nam; K. Fidkowski, E. Johnsen, University of Michigan, Ann Arbor, Ann Arbor, MI | 1630 hrs<br>AIAA-2016-1338<br>**Development of a Perfectly Matched Layer Technique for a Discontinuous-Galerkin Spectral-Element Method**<br>A. Garai, L. Diosady, S. Murman, N. Madavan, NASA Ames Research Center, Moffett Field, CA | |

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| **285-FD-36** | **Multiphase Flow I: Simulations and Models** | | | | | **Promenade B** |
| Chaired by: D. PELLETIER, École polytechnique de Montréal | | | | | | |
| 1400 hrs<br>AIAA-2016-1339<br>**Modeling of Large Droplets Impingement Using a Hybrid Taylor-Galerkin Variational Multi-Scale Stabilized Level Set Method**<br>A. Bakkar, W. Habashi, M. Fossati, McGill University, Montréal, Canada | 1430 hrs<br>AIAA-2016-1340<br>**An Adaptive Coupled Level Set and Moment-of-Fluid Method for Simulating Droplet Impact and Solidification on Solid Surfaces with Application to Aircraft Icing**<br>M. Vahab, C. Pei, M. Hussaini, M. Sussman, Florida State University, Tallahassee, FL; Y. Lian, University of Louisville, Louisville, KY | 1500 hrs<br>AIAA-2016-1341<br>**Computations of Evolving Oil Droplet on Surface of a Wall-Bounded Air Flow**<br>G. Bonnavion, Illinois Institute of Technology, Chicago, IL; W. Dziedzic, Dassault Systemes SolidWorks Corporation, Chicago, IL; A. Obabko, Argonne National Laboratory, Chicago, IL; H. Nagib, Illinois Institute of Technology, Chicago, IL | 1530 hrs<br>AIAA-2016-1342<br>**Adaptive time integration for separated two-phase viscous flows**<br>A. Hay, D. Pelletier, Defense Research and Development Canada, Montréal, Canada | | | |

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| **286-FD-37** | **Unsteady Vortex Flows** | | | | | **Promenade A** |
| Chaired by: Z. RUSAK, Rensselaer Polytechnic Institute and J. MORRIDA | | | | | | |
| 1400 hrs<br>AIAA-2016-1343<br>**Spanwise Effects on High Speed Cavity Flows**<br>Y. Sun, Y. Zhang, K. Taira, L. Cattafesta, Florida State University, Tallahassee, FL; B. George, L. Ukeiley, University of Florida, Gainesville, Gainesville, FL | 1430 hrs<br>AIAA-2016-1344<br>**Resonance Characteristics of Transonic Flow over a Rectangular Cavity using Pulse-Burst PIV**<br>S. Beresh, J. Wagner, E. Demauro, J. Henfling, R. Spillers, Sandia National Laboratories, Albuquerque, NM | 1500 hrs<br>AIAA-2016-1345<br>**Relationship between Transonic Cavity Tones and Flowfield Dynamics using Pulse-Burst PIV**<br>J. Wagner, S. Beresh, K. Casper, E. Demauro, S. Arunajatesan, J. Henfling, Sandia National Laboratories, Albuquerque, NM; et al. | 1530 hrs<br>AIAA-2016-1346<br>**Improvement in prediction capability of Transonic Buffet on NASA-CRM Using URANS**<br>K. Kumada, K. Sawada, Tohoku University, Sendai, Japan | 1600 hrs<br>AIAA-2016-1347<br>**Prediction of Dynamic Stability using Mapped Chebyshev Pseudospectral Method**<br>J. Choi, S. Choi, J. Park, D. Im, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1630 hrs<br>AIAA-2016-1348<br>**Investigation of Shock Dynamics on a Hemisphere Using Pressure and Optical Measurements**<br>J. Morrida, S. Gordeyev, E. Jumper, University of Notre Dame, Notre Dame, IN; S. Gogineni, Spectral Energies, LLC, Dayton, OH; A. Marruffo, D. Wittich, Air Force Research Laboratory, Kirtland AFB, NM | 1700 hrs<br>AIAA-2016-1349<br>**Transonic Flow Dynamics Over a Hemisphere in Flight**<br>J. Morrida, S. Gordeyev, E. Jumper, University of Notre Dame, Notre Dame, IN |

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| **287-FD-38** | **Unsteady Wing Aerodynamics** | | | | | **Cove** |
| Chaired by: C. BARNES, AFRL/RQVA and B. JOLLY, US Air Force | | | | | | |
| 1400 hrs<br>AIAA-2016-1350<br>**Two dimensional and three dimensional numerical simulation of cycloidal propellers in hovering status**<br>Y. Hu, H. Zhang, G. Wang, Northwestern Polytechnical University, Xi'an, China | 1430 hrs<br>AIAA-2016-1351<br>**Fluid-Structure Interaction simulations of a membrane wing with variable compliance**<br>G. Cetraro, R. Sandberg, University of Southampton, Southampton, United Kingdom | 1500 hrs<br>AIAA-2016-1352<br>**Spectral Decomposition and Scale Separation of the Dynamic Stall Vortices in a Plunging Airfoil**<br>A. Mohan, L. Agostini, Ohio State University, Columbus, OH; M. Visbal, Air Force Research Laboratory, Wright-Patterson AFB, OH; D. Gaitonde, Ohio State University, Columbus, OH | 1530 hrs<br>AIAA-2016-1353<br>**High-Fidelity LES Simulations of Self-Sustained Pitching Oscillations on a NACA0012 Airfoil at Transitional Reynolds Numbers**<br>C. Barnes, M. Visbal, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1600 hrs<br>AIAA-2016-1354<br>**Variation of Leading-Edge Suction at Stall for Steady and Unsteady Airfoil Motions**<br>S. Narsipur, P. Hosangadi, A. Gopalarathnam, J. Edwards, North Carolina State University, Raleigh, NC | 1630 hrs<br>AIAA-2016-1355<br>**Effects of 3D Time-Harmonic Gust and Turbulence on Unsteady Aerodynamic Responses of Loaded Low-Speed Airfoils**<br>M. Kazarina, L. Nguyen, V. Golubev, Embry-Riddle Aeronautical University, Daytona Beach, FL; S. Borener, D. Hufty, Federal Aviation Administration, Washington, D.C.; C. Pasiliao, Air Force Research Laboratory, Eglin AFB, FL; et al. | 1700 hrs<br>AIAA-2016-1356<br>**High Advance-Ratio Airfoil Streamwise Oscillations: Wind Tunnel vs. Water Tunnel**<br>H. Mueller-Vahl, D. Greenblatt, Technion-Israel Institute of Technology, Haifa, Israel; M. Ol, Air Force Research Laboratory, Wright-Patterson AFB, OH; K. Granlund, North Carolina State University, Raleigh, NC |

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| **288-FD-39/APA-31** | **Special Session: Evaluation of RANS Solvers on Benchmark Aerodynamic Flows II** | | | | | **Harbor E** |
| Chaired by: A. KATZ and K. FIDKOWSKI, University of Michigan | | | | | | |
| 1400 hrs<br>AIAA-2016-1357<br>**RANS simulations on TMR 3D test cases with the Onera *elsA* flow solver**<br>M. Julien, A. Dumont, V. Gleize, D. Destarac, ONERA, Châtillon, France | 1430 hrs<br>AIAA-2016-1358<br>**Results of Three-dimensional Turbulent Flow with FaSTAR**<br>A. Hashimoto, T. Ishida, T. Aoyama, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; K. Takekawa, K. Hayashi, Ryoyu Systems Company, Ltd., Nagoya, Japan | 1500 hrs<br>AIAA-2016-1359<br>**Development and Assessment of a Reconstructed Discontinuous Galerkin Method for the Compressible Turbulent Flows on Hybrid Grids**<br>X. Liu, H. Luo, North Carolina State University, Raleigh, NC | 1530 hrs<br>AIAA-2016-1360<br>**Critical Evaluation of Turbulence Modeling with the Flux Correction Method on Strand Grids**<br>Y. Yanagita, O. Tong, A. Katz, Utah State University, Logan, UT | 1600 hrs<br>AIAA-2016-1361<br>**Application of HPCMP CREATE™-AV COFFE for Three-Dimensional Turbulent Flow Cases**<br>J. Erwin, R. Glasby, University of Tennessee, Oak Ridge, Oak Ridge, TN | | |

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| **289-GEPC-4** | **Alternative Fuels and Green Engineering Computations** | | | | | **Americas Cup B** |
| Chaired by: N. HICKS and T. ABDEL-SALAM, East Carolina University | | | | | | |
| 1400 hrs<br>AIAA-2016-1362<br>**Potential Market Sizes and Adoption Schedules of Liquid Natural Gas Commercial Aircraft and the LNG Air Transportation System**<br>J. Gibbs, K. Wicke, T. Schilling, R. Ghosh, B. Nagel, O. Pape, German Aerospace Center (DLR), Hamburg, Germany | 1430 hrs<br>AIAA-2016-1363<br>**Biodiesel for Aviation use in New Zealand**<br>R. Davies, G. Gunabalan, C. Davies, Massey University, Palmerston North, New Zealand | 1500 hrs<br>AIAA-2016-1364<br>**Comparative Assessment of Air Distribution Systems : Improving Indoor Thermal Comfort in Office Spaces**<br>E. Khalil, A. Abou Zeid, Cairo University, Giza, Egypt | 1530 hrs<br>AIAA-2016-1365<br>**Flow Regimes in Turbulent Swirling Flames in Cylindrical Furnaces**<br>E. Khalil, K. Samir, Cairo University, Giza, Egypt | 1600 hrs<br>AIAA-2016-1366<br>**On the Computations of Double Squealer and Flat Gas Turbine Blades Tips**<br>E. Khalil, Cairo University, Giza, Egypt; H. El-Zomor, M. Morsy, High Technological Institute, Cairo, Egypt | 1630 hrs<br>AIAA-2016-1367<br>**Computational Analyses of Aerodynamic Characteristics of NACA653218airfoil**<br>E. Khalil, Cairo University, Giza, Egypt; O. Abdelattif, Benha University, Cairo, Egypt; E. AbdelGhany, G. ElHariri, Cairo University, Giza, Egypt | 1700 hrs<br>AIAA-2016-1368<br>**Computations of Aerodynamic Behaviour of Rectangular Wing with Naca653218airfoil**<br>E. Khalil, E. AbdelGhany, Cairo University, Giza, Egypt; O. Abdelattif, Benha University, Cairo, Egypt; G. ElHariri, Cairo University, Giza, Egypt |

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| **290-GNC-24** | **Spacecraft Trajectory Optimization and Orbit Control** | | | | | **Hillcrest B** |
| Chaired by: J. REED, United Launch Alliance, LLC and U. SHANKAR, The Johns Hopkins University Applied Physics Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-1369<br>**Spinning CubeSats with Liquid Propellant**<br>K. Doyle, M. Peck, Cornell University, Ithaca, NY; L. Jones, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | 1430 hrs<br>AIAA-2016-1370<br>**The Method of Multiple Scales for Orbit Propagation with Atmospheric Drag**<br>A. Awad, A. Narang-Siddarth, University of Washington, Seattle, Seattle, WA; R. Weisman, Air Force Research Laboratory, Kirtland AFB, NM | 1500 hrs<br>AIAA-2016-1371<br>**Flight-Path Angle Guidance for Aero-Gravity Assist Maneuvers on Hyperbolic Trajectories**<br>A. Mazzaracchio, University of Rome "La Sapienza", Rome, Italy | 1530 hrs<br>AIAA-2016-1372<br>**Three-Dimensional Trajectory Optimization for Lunar Ascent Using Gauss Pseudospectral Method**<br>L. Ma, Z. Shao, W. Chen, Zhejiang University, Hangzhou, China; X. Lv, Z. Song, Beijing Aerospace Automatic Control Institute, Beijing, China | 1600 hrs<br>AIAA-2016-1373<br>**An Observability-Based Trajectory Optimization Considering Disturbance for Atmospheric Entry**<br>Z. Yu, Z. Zhao, P. Cui, Beijing Institute of Technology, Beijing, China | | |

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| **291-GNC-25** | **Invited Session: Advances in Guidance and Control of Unmanned Air Vehicles** | | | | | **Hillcrest A** |
| Chaired by: S. CHUNG, University of Illinois at Urbana-Champaign and N. HOVAKIMYAN, University of Illinois at Urbana-Champaign | | | | | | |
| 1400 hrs<br>AIAA-2016-1374<br>**A Real-Time Framework for Kinodynamic Planning with Application to Quadrotor Obstacle Avoidance**<br>R. Allen, M. Pavone, Stanford University, Stanford, CA | 1430 hrs<br>AIAA-2016-1375<br>**Convex Multi-Objective Filter Optimization for Output Feedback L1-Adaptive Controller**<br>H. Jafarnejadsani, H. Lee, N. Hovakimyan, University of Illinois, Urbana-Champaign, Urbana, IL | 1500 hrs<br>AIAA-2016-1376<br>**Nonlinear Flight Controller Synthesis of a Bat-Inspired Micro Aerial Vehicle**<br>A. Ramezani, X. Shi, S. Chung, S. Hutchinson, University of Illinois, Urbana-Champaign, Urbana, IL | 1530 hrs<br>AIAA-2016-1377<br>**Bio-Inspired Algorithm for Task Allocation in Multi-UAV Search and Rescue Missions**<br>H. Kurdi, J. How, Massachusetts Institute of Technology, Cambridge, MA | 1600 hrs<br>AIAA-2016-1378<br>**Robotic Herding Flight using Herding Primitives and Wavefront Algorithms**<br>S. Gade, University of Illinois, Urbana-Champaign, Urbana, IL; A. Paranjape, Indian Institute of Technology Bombay, Mumbai, India; S. Chung, University of Illinois, Urbana-Champaign, Urbana, IL | | |

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| **292-GNC-26** | **H Infinity, Nonlinear, and Adaptive Flight Control** | | | | | **Hillcrest C** |
| Chaired by: H. TAHA, University of California, Irvine and E. VAN KAMPEN, TU Delft | | | | | | |
| 1400 hrs<br>AIAA-2016-1379<br>**Sequential Loop Closure Based Adaptive Autopilot Design for a Hypersonic Vehicle**<br>D. Wiese, A. Annaswamy, Massachusetts Institute of Technology, Cambridge, MA; J. Muse, M. Bolender, Air Force Research Laboratory, Wright-Patterson AFB, OH; E. Lavretsky, The Boeing Company, Huntington Beach, CA | 1430 hrs<br>AIAA-2016-1380<br>**Adaptive Incremental Backstepping Flight Control for a High-Performance Aircraft with Uncertainties**<br>P. van Gils, E. Van Kampen, C. de Visser, Q. Chu, Delft University of Technology, Delft, The Netherlands | 1500 hrs<br>AIAA-2016-1381<br>**Comparison of Robust and Probabilistic LMI-Based Design of Adaptive Flight Controllers with Uncertain Input Dynamics**<br>M. Fravolini, University of Perugia, Perugia, Italy; T. Yucelen, B. Gruenwald, D. Wagner, Missouri University of Science and Technology, Rolla, MO; M. Napolitano, West Virginia University, Morgantown, WV | 1530 hrs<br>AIAA-2016-1382<br>**L1 Adaptive Control with Eigenstructure Assignment for Pole Placement considering Actuator Dynamics and Delays**<br>F. Hellmundt, Airbus Group, Munich, Germany; J. Dodenhöft, F. Holzapfel, Technical University of Munich, Garching, Germany | 1600 hrs<br>AIAA-2016-1383<br>**Nonlinear Aircraft Flight Control Using the Forward Propagating Riccati Equation**<br>A. Prach, O. Tekinalp, Middle East Technical University, Ankara, Turkey; D. Bernstein, University of Michigan, Ann Arbor, MI | | |

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| **293-GNC-27** | **Control of Multirotor Aircraft** | | | | | **Cortez Hill B** |
| Chaired by: V. STEPANYAN, University of California, Santa Cruz and J. JUNELL, Jaime Junell | | | | | | |
| 1400 hrs<br>AIAA-2016-1384<br>**Identification and reconfigurable Control of Impaired Multi-Rotor Drones**<br>V. Stepanyan, University of California, Santa Cruz, Santa Cruz, CA; K. Krishnakumar, NASA Ames Research Center, Moffett Field, CA; A. Bencomo, Stinger Ghaffarian Technologies, Inc., Moffett Field, CA | 1430 hrs<br>AIAA-2016-1385<br>**Autonomous Position Control Analysis of Quadrotor Flight in Urban Wind Gust Conditions**<br>S. Raza, J. Etele, Carleton University, Ottawa, Canada | 1500 hrs<br>AIAA-2016-1386<br>**Onboard Flow Sensing for Rotary-Wing UAV Pitch Control in Wind**<br>D. Yeo, N. Sydney, D. Paley, University of Maryland, College Park, College Park, MD | 1530 hrs<br>AIAA-2016-1387<br>**Self-tuning Gains of a Quadrotor using a Simple Model for Policy Gradient Reinforcement Learning**<br>J. Junell, T. Mannucci, Y. Zhou, E. Van Kampen, Delft University of Technology, Delft, The Netherlands | 1600 hrs<br>AIAA-2016-1388<br>**Position Tracking of an Underactuated Quadrotor using Model Reference Adaptive Control**<br>A. Abdul Ghaffar , T. Richardson, University of Bristol, Bristol, United Kingdom | 1630 hrs<br>AIAA-2016-1389<br>**Robust Tracking Control of a Quadrotor with Time-Varying Gain in the Presence of Uncertainty and Disturbances**<br>C. Ton, Air Force Research Laboratory, Eglin AFB, FL; M. McCourt, S. Mehta, University of Florida, Shalimar, Shalimar, FL | 1700 hrs<br>AIAA-2016-1390<br>**Adaptive Incremental Nonlinear Dynamic Inversion for Attitude Control of Micro Aerial Vehicles**<br>E. Smeur, Q. Chu, G. de Croon, Delft University of Technology, Delft, The Netherlands |

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| **294-GTE-10** | **Combustion II** | | | | | **Cortez Hill C** |
| Chaired by: S. NAIK, Purdue University and C. LI, Air Force Office of Scientific Research | | | | | | |
| 1400 hrs<br>AIAA-2016-1391<br>**Modeling of Methane Ingestion into Gas Turbine Engines**<br>J. Delimont, Southwest Research Institute, San Antonio, TX | 1430 hrs<br>AIAA-2016-1392<br>**Mechanisms for Enhanced Flow Migration from an Annular, High-g Ultra Compact Combustor**<br>A. Cottle, M. Polanka, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1500 hrs<br>AIAA-2016-1393<br>**High-Fidelity Simulations of Fuel Injection and Atomization of a Hybrid Air-Blast Atomizer**<br>P. Ma, L. Esclape, S. Carbajal, M. Ihme, Stanford University, Stanford, CA; T. Buschhagen, S. Naik, Purdue University, West Lafayette, IN; et al. | 1530 hrs<br>AIAA-2016-1394<br>**Parametric Modeling Investigation of a Radially-Staged Low-Emission Aviation Combustor**<br>C. Heath, NASA Glenn Research Center, Cleveland, OH | 1600 hrs<br>AIAA-2016-1395<br>**Numerical Study on Flame Stabilization Mechanism of a multi-jet burner with LES Flamelet Approach**<br>Y. Tang, H. Koo, University of Michigan, Ann Arbor, Ann Arbor, MI; C. Lietz, University of Texas, Austin, Austin, TX; V. Raman, University of Michigan, Ann Arbor, Ann Arbor, MI | 1630 hrs<br>AIAA-2016-1396<br>**Experimental and Computational Imaging of Mid-Infrared Radiation from a Turbulent Ethylene Flame**<br>H. Lalit, R. Kapaku, Purdue University, West Lafayette, IN; B. Rankin, Air Force Research Laboratory, Wright-Patterson AFB, OH; M. Mueller, Princeton University, Princeton, NJ; J. Gore, Purdue University, West Lafayette, IN | |

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| **295-HIS-3** | **Boeing Centennial 1916-2016 I** | | | | | **Americas Cup A** |
| Chaired by: S. MUSI | | | | | | |
| 1400 hrs<br>Oral Presentation<br>**Boeing Centennial Session Opening Presentation**<br>M. Lombardi, The Boeing Company, Seattle, WA | | | 1530 hrs<br>AIAA-2016-1397<br>**The Boeing Aerodynamical Chamber and its Impact on Aeronautics Education at the University of Washington**<br>A. Bruckner, University of Washington, Seattle, Seattle, WA; S. Eberhardt, Self, Leavenworth, WA; J. Lee, S. Musi, The Boeing Company, Seattle, WA | 1600 hrs<br>AIAA-2016-1398<br>**The History of Boeing Heritage Companies Impact on Naval Tactical Aircraft**<br>R. Dowgwillo, The Boeing Company, St. Louis, MO | 1630 hrs<br>AIAA-2016-1399<br>**Vanguard: A Pre-History of The Boeing Company**<br>S. Musi, The Boeing Company, Seattle, WA | |

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| **296-HSABP-5** | **Advances in Pressure Gain Combustion II - RDE & PDE** | | | | | **Regatta A** |
| Chaired by: K. KAILASANATH, Naval Research Laboratory and J. KASAHARA, Nagoya University | | | | | | |
| 1400 hrs<br>AIAA-2016-1400<br>**Propane-Air Cell Size Correlation to Temperature and Pressure**<br>C. Stevens, J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; F. Schauer, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1430 hrs<br>AIAA-2016-1401<br>**One-Dimensional Numerical Investigation on Purging the Burned Gas by the Evaporation of Water Droplets in Pulse Detonation Combustor**<br>H. Watanabe, A. Matsuo, Keio University, Yokohama, Japan; K. Muto, K. Matsuoka, J. Kasahara, Nagoya University, Nagoya, Japan; T. Endo, Hiroshima University, Higashi-Hiroshima, Japan | 1500 hrs<br>AIAA-2016-1402<br>**A Correlation-Based Method to Quantify the Operating State in a Rotating Detonation Combustor**<br>A. St. George, V. Ganesh Kumar, R. Driscoll, E. Gutmark, University of Cincinnati, Cincinnati, OH | 1530 hrs<br>AIAA-2016-1403<br>**Parametric Study of an Ethylene-Air Rotating Detonation Engine Using an Ideal Model**<br>R. Fievisohn, K. Yu, University of Maryland, College Park, College Park, MD | 1600 hrs<br>AIAA-2016-1404<br>**Experimentation of a Premixed Rotating Detonation Engine Utilizing a Variable Slot Feed Plenum**<br>I. Andrus, P. King, M. Polanka, Air Force Institute of Technology, Wright-Patterson AFB, OH; F. Schauer, Air Force Research Laboratory, Wright-Patterson AFB, OH; J. Hoke, Innovative Scientific Solutions, Inc., Centerville, OH | 1630 hrs<br>AIAA-2016-1405<br>**Thermodynamic Modeling of a Rotating Detonation Engine Through a Reduced Order Approach**<br>T. Kaemming, M. Fotia, J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; F. Schauer, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1700 hrs<br>AIAA-2016-1406<br>**Study of Combustion Chamber Characteristic Length in Rotating Detonation Engine with Convergent-Divergent Nozzle**<br>Y. Kato, K. Ishihara, K. Matsuoka, J. Kasahara, Nagoya University, Nagoya, Japan; A. Matsuo, Keio University, Yokohama, Japan; I. Funaki, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan |

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| **297-IS-7** | **Machine Learning and Probabilistic Reasoning for Intelligent UAS** | | | | | **Regatta B** |
| Chaired by: D. CASBEER, Air Force Reseach Laboratory and A. AGHA-MOHAMMADI | | | | | | |
| 1400 hrs<br>AIAA-2016-1407<br>**Health-Aware Multi-UAV Planning using Decentralized Partially Observable Semi-Markov Decision Processes**<br>S. Omidshafiei, A. Agha-mohammadi, Massachusetts Institute of Technology, Cambridge, MA; C. Amato, University of New Hampshire, Durham, Durham, NH; S. Liu, J. How, Massachusetts Institute of Technology, Cambridge, MA; J. Vian, The Boeing Company, Seattle, WA | 1430 hrs<br>AIAA-2016-1408<br>**Analytic Chance Constraints for the Robust Guidance of Autonomous Parafoils**<br>A. Ellertson, J. How, Massachusetts Institute of Technology, Cambridge, MA; L. Breger, Draper Laboratory, Cambridge, MA | 1500 hrs<br>AIAA-2016-1409<br>**Scalable Decentralized Partial State Estimation with Sensor Uncertainties Using Factorized Data Fusion**<br>N. Ahmed, University of Colorado, Boulder, Boulder, CO; W. Whitacre, Draper Laboratory, Cambridge, MA; S. Moon, E. Frew, University of Colorado, Boulder, Boulder, CO | 1530 hrs<br>AIAA-2016-1410<br>**Co-operation in an Autonomous, Decentralised, Unmanned Air System for Atmospheric Research**<br>C. Crispin, A. Sobester, University of Southampton, Southampton, United Kingdom | 1600 hrs<br>AIAA-2016-1411<br>**Trajectory Clustering, Modeling and Selection with the focus on Airspace Protection**<br>W. Eerland, S. Box, University of Southampton, Southampton, United Kingdom | 1630 hrs<br>AIAA-2016-1412<br>**Deep Convolutional Neural Network For Human Detection And Tracking In FLIR Videos**<br>A. Sathyan, University of Cincinnati, Cincinnati, OH; J. Cohen, University of Michigan, Ann Arbor, MI; M. Kumar, University of Cincinnati, Cincinnati, OH | |

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| **298-MAT-8** | **Advanced Materials and Processing** | | | | | **Gaslamp B** |
| Chaired by: M. NARAGHI, Texas A & M university and D. POWELL, SpaceX | | | | | | |
| 1400 hrs<br>AIAA-2016-1413<br>**Characterizing Mechanical Properties of Hybrid Alumina Carbon Fiber Composites with Piezospectroscopy**<br>I. Hanhan, A. Selimov, University of Central Florida, Orlando, FL; D. Carolan, A. Taylor, Imperial College London, London, United Kingdom; S. Raghavan, University of Central Florida, Orlando, FL | 1430 hrs<br>AIAA-2016-1414<br>**Development of Advanced Conformal Ablative TPS Fabricated from Rayon- and Pan-Based Carbon Felts**<br>M. Gasch, M. Stackpoole, S. White, NASA Ames Research Center, Moffett Field, CA; T. Boghozian, ERC Inc., Moffett Field, CA | 1500 hrs<br>AIAA-2016-1415<br>**Flexible Lightweight Adjustable Stiffness Hinge (FLASH) for Advanced Cable Technology**<br>J. Mejia-Ariza, L.Garde, Inc., Tustin, CA; T. Murphey, Opterus Research and Development, Inc., Syracuse, NY | 1530 hrs<br>AIAA-2016-1416<br>**Fabrication of High Thermal Conductivity NARloy-Z-Diamond Composite Combustion Chamber Liner for Advanced Rocket Engines**<br>B. Bhat, S. Greene, NASA Marshall Space Flight Center, Huntsville, AL; J. Singh, Pennsylvania State University, University Park, PA | 1600 hrs<br>AIAA-2016-1417<br>**Development of a Novel Self-Healing Polymer with High Temperature Stability**<br>Y. Heo, University of Florida, Gainesville, Gainesville, FL; H. Sodano, University of Michigan, Ann Arbor, Ann Arbor, MI | 1630 hrs<br>AIAA-2016-1418<br>**An Experimental Study into Active Damping Mechanisms in CNT Nanocomposite**<br>F. Gardea, D. Lagoudas, M. Naraghi, Texas A&M University, College Station, TX | |

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| **299-MDO-6** | **Design Including Uncertainty & Frameworks** | | | | | **Balboa A** |
| Chaired by: M. RAIS-ROHANI, Mississippi State University and J. DEATON, Adjoint Technologies | | | | | | |
| 1400 hrs<br>AIAA-2016-1419<br>**Uncertainty Quantification for Cargo Hold Fires**<br>A. DeGennaro, M. Lohry, L. Martinelli, C. Rowley, Princeton University, Princeton, NJ | 1430 hrs<br>AIAA-2016-1420<br>**Using Multiple Information Sources to Construct Stochastic Databases to Quantify Uncertainty in Certification Maneuvers**<br>A. Wendorff, J. Alonso, Stanford University, Stanford, CA; S. Bieniawski, The Boeing Company, Chicago, IL | 1500 hrs<br>AIAA-2016-1421<br>**Optimization Under Uncertainty of Parallel Nonlinear Energy Sinks**<br>E. Boroson, S. Missoum, University of Arizona, Tucson, Tucson, AZ | 1530 hrs<br>AIAA-2016-1422<br>**Kona: A Parallel Optimization Library for Engineering-Design Problems**<br>A. Dener, P. Meng, J. Hicken, Rensselaer Polytechnic Institute, Troy, NY; G. Kennedy, Georgia Institute of Technology, Atlanta, GA; J. Hwang, University of Michigan, Ann Arbor, Ann Arbor, MI; J. Gray, NASA Glenn Research Center, Cleveland, OH | 1600 hrs<br>AIAA-2016-1423<br>**Sensitivity analysis methods for uncertainty budgeting in system design**<br>M. Opgenoord, K. Willcox, Massachusetts Institute of Technology, Cambridge, MA | 1630 hrs<br>AIAA-2016-1424<br>**A Multi-Disciplinary Study of Future Fuel Efficient Regional Aircraft**<br>R. Palma, M. Thomas, A. Balasiu, L. Takamatsu, W. Noonan, T. Takahashi, Arizona State University, Tempe, AZ | |

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| **300-MST-8** | **Hardware-in-the-Loop Simulation** | | | | | **Golden Hill A** |
| Chaired by: R. RUFF and U. DURAK, DLR-German Aerospace Center | | | | | | |
| 1400 hrs<br>AIAA-2016-1425<br>**Benchmarking Variants of a Hardware-in-the-Loop Simulation System**<br>E. Aretskin-Hariton, NASA Glenn Research Center, Cleveland, OH; A. Zinnecker, N&R Engineering, Inc., Parma Heights, OH; J. Kratz, D. Culley, NASA Glenn Research Center, Cleveland, OH; G. Thomas, N&R Engineering, Inc., Parma Heights, OH | 1430 hrs<br>AIAA-2016-1426<br>**Integrated Energy and Power Management: Validation Testing for Aerosapce Vehicles**<br>K. Yerkes, Air Force Research Laboratory, Wright-Patterson AFB, OH; B. Eussen, National Aerospace Laboratory (NLR), Amsterdam, The Netherlands ; D. Pratt, Air Force Research Laboratory, Wright-Patterson AFB, OH; J. van Muijden, National Aerospace Laboratory (NLR), Amsterdam, The Netherlands ; J. Doty, University of Dayton, Dayton, OH | 1500 hrs<br>AIAA-2016-1427<br>**How to Realize Coupling of HIL Simulations over Large Distances**<br>A. Himmler, dSPACE GmbH, Paderborn, Germany | 1530 hrs<br>AIAA-2016-1428<br>**Modeling and Simulation Hardware-in-the-Loop for Unmanned Aerial Vehicle**<br>A. Shawky Mohamedy, A. Aly, A. Elnashar, Military Technical College, Cairo, Egypt | | | |

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| **301-MST-9** | **Invited Session: LOC-6, Simulation-Based Evaluations for Improved Pilot Insights and Training for LOC Prevention and Recovery.** | | | | | **Coronado B** |
| Chaired by: C. BELCASTRO, NASA-Langley Research Center and D. CRIDER, National Transportation Safety Board | | | | | | |
| 1400 hrs<br>AIAA-2016-1429<br>**Upset Prevention and Recovery Training - A Regulator Update**<br>J. Schroeder, Federal Aviation Administration, Moffett Field, CA | 1430 hrs<br>AIAA-2016-1430<br>**Global Implementation of Upset Prevention & Recovery Training**<br>S. Advani, International Development of Technology, Breda, The Netherlands ; J. Schroeder, Federal Aviation Administration, Washington, D.C.; B. Burks, Alaska Airlines, Seattle, WA | 1500 hrs<br>Oral Presentation<br>**Integrated Multidisciplinary Piloted Simulation Capability for Aircraft Loss of Control (LOC) Research**<br>G. Shah, K. Cunningham, J. Foster, NASA Langley Research Center, Hampton, VA; M. Hill, Unisys Corporation, Hampton, VA; T. Guo, J. Litt, NASA Glenn Research Center, Cleveland, OH | 1530 hrs<br>Oral Presentation<br>**Modeling and Simulation Development of a T-Tail Regional Aircraft for LOC Research**<br>G. Shah, J. Foster, K. Cunningham, D. Cox, J. Petrilli, N. Frink, NASA Langley Research Center, Hampton, VA | 1600 hrs<br>AIAA-2016-1431<br>**A Computational Model for Prediction of Pilot Manual Control Behavior in Air Transport Concepts of Operation**<br>D. Dickson, A. Pritchett, A. Bozan, Georgia Institute of Technology, Atlanta, GA | 1630 hrs<br>AIAA-2016-1432<br>**Are Pilots in Control? How do pilots react to unexpected situations?**<br>J. Field, A. Lemmers, E. Boland, National Aerospace Laboratory (NLR), Amsterdam, The Netherlands | |

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| **302-MST-10** | **Motion Systems, Visual Systems, and Image Generation** | | | | | **Golden Hill B** |
| Chaired by: P. ZAAL, NASA Ames Research Center and D. CARTMELL, Boeing Engineering Operations & Technology | | | | | | |
| 1400 hrs<br>AIAA-2016-1433<br>**ISS Double-Gimbaled CMG Subsystem Design using the Agile Development Method**<br>R. Inampudi, Lockheed Martin Corporation, Houston, TX | 1430 hrs<br>AIAA-2016-1434<br>**Motion Simulator 2-Axis Input Design for Angular Accelerometer Calibration**<br>D. Jatiningrum, C. de Visser, M. van Paassen, M. Mulder, Delft University of Technology, Delft, The Netherlands | 1500 hrs<br>AIAA-2016-1435<br>**Non-intrusive Flight Test Instrumentation using Video Recognition**<br>J. Ricciardi, C. Minwalla, National Research Council Canada, Ottawa, Canada | 1530 hrs<br>AIAA-2016-1436<br>**A Review of Control Schemes for Hydraulic Stewart Platform Flight Simulator Motion Systems**<br>Y. Huang, D. Pool, O. Stroosma, Q. Chu, M. Mulder, Delft University of Technology, Delft, The Netherlands | 1600 hrs<br>AIAA-2016-1437<br>**Modeling and Simulation of Hydraulic Hexapod Flight Simulator Motion Systems**<br>Y. Huang, D. Pool, O. Stroosma, Q. Chu, M. Mulder, Delft University of Technology, Delft, The Netherlands | 1630 hrs<br>AIAA-2016-1438<br>**Modeling and Simulation Activities for Digital Sun Sensor Development**<br>M. Celebi, F. Gulmammadov, TUBITAK, Ankara, Turkey | 1700 hrs<br>AIAA-2016-1439<br>**Adaptive Control of a Camera-Projection System using Vision-Based Feedback**<br>C. Liao, M. Bender, A. Kurdila, S. Southward, Virginia Polytechnic Institute and State University, Blacksburg, VA |

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| **303-NDA-5** | **Non-Deterministic Methods** | | | | | **Old Town B** |
| Chaired by: S. SANKARARAMAN, SGT Inc., NASA Ames Research Center and P. BERAN, US Air Force Research Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-1440<br>**Importance Sampling-based Post-Processing Method for Global Sensitivity Analysis**<br>D. Sparkman, Universal Technology Corporation, Dayton, OH; H. Millwater, J. Garza, University of Texas, San Antonio, San Antonio, TX; B. Smarslok, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1430 hrs<br>AIAA-2016-1441<br>**A New Approach for Probability of Failure Analysis with Distributed Failure Region**<br>P. Wang, X. Cui, Wichita State University, Wichita, KS | 1500 hrs<br>AIAA-2016-1442<br>**Multifidelity Uncertainty Propagation in Coupled Multidisciplinary Systems**<br>A. Chaudhuri, K. Willcox, Massachusetts Institute of Technology, Cambridge, MA | 1530 hrs<br>AIAA-2016-1443<br>**Compositional Uncertainty Analysis via Importance Weighted Gibbs Sampling for Coupled Multidisciplinary Systems**<br>S. Ghoreishi, D. Allaire, Texas A&M University, College Station, TX | 1600 hrs<br>AIAA-2016-1444<br>**A Dynamic Data-Driven Approach to Optimal Offline Learning for Online Flight Capability Estimation**<br>B. Isaac, D. Allaire, Texas A&M University, College Station, TX | 1630 hrs<br>AIAA-2016-1445<br>**A Corrector for Probability Dilution in Satellite Conjunction Analysis**<br>M. Balch, Alexandria Validation Consulting, LLC, Alexandria, VA | 1700 hrs<br>AIAA-2016-1446<br>**Stochastic Models for Fast Analysis of Unsteady Wing Aerodynamics**<br>M. Fluck, C. Crawford, University of Victoria, Victoria, Canada |

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| **304-PANEL-9**<br>**1400 - 1600 hrs** | **Wednesday Afternoon Forum 360**<br><br>**Space Exploration Through Advancing Technologies** | **Seaport F-G** |

Moderator: Steve Gaddis, Director, Game Changing Development Program, NASA

Panelists:

**Michelle Munk**
Principal Technologist for Entry, Descent, and Landing
NASA

**Molly Anderson**
Principal Technologist for Next Gen Life Support
NASA

**Matthew Simon**
Habitat Design Lead for the Human Spaceflight Architecture Team
NASA

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| **305-PC-12** | **Spray and Droplet Combustion I** | | | | | **Harbor B** |
| Chaired by: M. SOTERIOU, United Technologies Research Center and J. GORE, Purdue University | | | | | | |
| 1400 hrs<br>AIAA-2016-1447<br>**Investigation of Reduced Toxicity Hypergolic Fuels – Renewed Efforts in the Department of the Navy**<br>J. Dennis, J. Clubb, Naval Air Warfare Center, China Lake, CA | 1430 hrs<br>AIAA-2016-1448<br>**Impingement and splashing of droplets on spherical targets**<br>G. Charalampous, Y. Hardalupas, Imperial College London, London, United Kingdom | 1500 hrs<br>AIAA-2016-1449<br>**LES based evaluation of multi-component fuel evaporation effects at aero-engine conditions**<br>V. Sankaran, J. Lee, H. Gao, M. Soteriou, United Technologies Corporation, East Hartford, CT | 1530 hrs<br>AIAA-2016-1450<br>**High Fidelity Simulation of Liquid Jet in Crossflow Under Dynamic Excitation**<br>X. Li, M. Soteriou, United Technologies Corporation, East Hartford, CT | 1600 hrs<br>AIAA-2016-1451<br>**High Heat Flux Surface Coke Deposition and Removal Assessment**<br>D. Wickham, J. Engel, B. Hitch, A. Wickham, Reaction Systems, Inc., Golden, CO | 1630 hrs<br>AIAA-2016-1452<br>**Hollow-Cone Spray Modeling for Outwardly Opening Piezoelectric Injector**<br>J. Sim, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia; J. Badra, Saudi Aramco, Dhahran, Saudi Arabia; H. Im, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia | 1700 hrs<br>AIAA-2016-1453<br>**Design Procedure of a Movable Pintle Injector for Liquid Rocket Engines**<br>M. Son, K. Yu, K. Radhakrishnan, J. Koo, Korea Aerospace University, Goyang, South Korea |

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| **306-PC-13** | **Turbulent Combustion I - Experiments** | | | | | **Harbor C** |
| Chaired by: T. LIEUWEN, Georgia Institute of Technology and B. RANKIN, Air Force Research Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-1454<br>**Experimental Assessment of the Turbulent Premixed Combustion Regime Diagram Boundaries**<br>A. Skiba, T. Wabel, J. Temme, J. Driscoll, University of Michigan, Ann Arbor, Ann Arbor, MI | 1430 hrs<br>AIAA-2016-1455<br>**Characterization of Aerodynamically Stabilized Flames Using Simultaneous Analysis of Planar and Line-of-Sight Images**<br>I. Chterev, B. Emerson, T. Lieuwen, Georgia Institute of Technology, Atlanta, GA | 1500 hrs<br>AIAA-2016-1456<br>**Comparison of Three Interacting V-Flames to a Single Bluff-Body Flame at Two Reynolds Numbers**<br>W. Culler, A. Tyagi, Pennsylvania State University, University Park, PA; P. Venkateswaran, Trinity College, Hartford, CT; J. O`Connor, Pennsylvania State University, University Park, PA | 1530 hrs<br>AIAA-2016-1457<br>**Experimental studies of freely propagating turbulent premixed kernels in low speed channel flow**<br>D. Fries, B. Ochs, S. Menon, Georgia Institute of Technology, Atlanta, GA | 1600 hrs<br>AIAA-2016-1686<br>**The Mixture Fraction for High-Pressure Turbulent Reactive Flows**<br>J. Bellan, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | | |

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| **307-PDL-9/FD-40** | **Experimental and Numerical Studies of Large Eddy Structures** | | | | | **Ocean Beach** |
| Chaired by: N. BISEK, Air Force Reseach Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-1458<br>**Investigations of Transonic Flow over a Hemisphere using DES and hybrid RANS/LES Turbulence Models**<br>C. Tam, T. Madden, Air Force Research Laboratory, Kirtland AFB, NM; B. Thurow, Auburn University, Auburn, AL | 1430 hrs<br>AIAA-2016-1459<br>**Studies of Flow Topology around Hemisphere at Transonic Speeds Using Time-Resolved Oil Flow Visualization**<br>S. Gordeyev, A. Vorobiev, E. Jumper, University of Notre Dame, Notre Dame, IN; S. Gogineni, Spectral Energies, LLC, Dayton, OH; D. Wittich, Air Force Research Laboratory, Kirtland AFB, NM | 1500 hrs<br>AIAA-2016-1460<br>**Optical investigation of large-scale boundary-layer structures**<br>M. Kemnetz, S. Gordeyev, University of Notre Dame, Notre Dame, IN | 1530 hrs<br>AIAA-2016-1461<br>**LES of an Aero-Optical Turret Flow at High Reynolds Number**<br>E. Mathews, K. Wang, M. Wang, E. Jumper, University of Notre Dame, Notre Dame, IN | 1600 hrs<br>AIAA-2016-1462<br>**Predictions of Aero-Optical Distortions Using LES with Wall Modeling**<br>M. Kamel, K. Wang, M. Wang, University of Notre Dame, Notre Dame, IN | | |

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| **308-SATS-3** | **Small Satellites - Missions** | | | | | **Hillcrest D** |
| Chaired by: J. STRAUB, University of North Dakota | | | | | | |
| 1400 hrs<br>AIAA-2016-1463<br>**The CUSPED Mission: CUbeSat for GNSS Sounding of the Ionosphere-Plasmasphere Electron Density**<br>J. Gross, A. Keesee, J. Christian, Y. Gu, E. Saime, West Virginia University, Morgantown, WV; A. Komjathy, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; et al. | 1430 hrs<br>AIAA-2016-1464<br>**Simulation-to-Flight 1 (STF-1): A Mission to Enable CubeSat Software-based Verification and Validation**<br>J. Morris, S. Zemerick, M. Grubb, J. Lucas, NASA Goddard Space Flight Center, Greenbelt, MD; M. Jaridi, J. Gross, West Virginia University, Morgantown, WV; et al. | 1500 hrs<br>AIAA-2016-1465<br>**Autonomous Rendezvous and Docking of Two 3U Cubesats Using a Novel Permanent-Magnet Docking Mechanism**<br>J. Pei, L. Murchison, V. Stewart, J. Rosenthal, D. Sellers, M. Banchy, NASA Langley Research Center, Hampton, VA; et al. | 1530 hrs<br>AIAA-2016-1466<br>**MarsCAT: Mars Array of ionospheric Research Satellites using the CubeSat Ambipolar Thruster**<br>E. Bering, L. Pinsky, L. Li, D. Jackson, J. Chen, University of Houston, Houston, TX; H. Reed, Texas A&M University, College Station, TX; et al. | 1600 hrs<br>AIAA-2016-1467<br>**SRMSAT: A Feasibility Study on Small Satellite Mission to Moon**<br>A. Ratheesh, K. Barad, K. Naik, S. Pavuluri, A. Singha, H. Bhate, SRM University, Chennai, India; et al. | 1630 hrs<br>AIAA-2016-1468<br>**Dynamics of Chip-scale Spacecraft Swarms near Irregular Bodies**<br>L. Weis, M. Peck, Cornell University, Ithaca, NY | |

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| **309-SCS-4** | **Spacecraft Membranes, Booms, and Trusses II** | | | | | **Balboa B** |
| Chaired by: O. SOYKASAP, Afyon Kocatepe University and H. SAKAMOTO, Tokyo Institute of Technology | | | | | | |
| 1400 hrs<br>AIAA-2016-1469<br>**Thermal deformation of very slender TRAC booms**<br>O. Stohlman, NASA Langley Research Center, Hampton, VA; E. Loper, NASA Marshall Space Flight Center, Huntsville, AL | 1430 hrs<br>AIAA-2016-1470<br>**An Analysis of a Coiled Tape Spring during Extension and Compression**<br>A. Hoskin, A. Viquerat, University of Surrey, Guildford, United Kingdom | 1500 hrs<br>AIAA-2016-1471<br>**Stepwise Deployments of Membrane Structure with Rolled-up Braided CFRP Bi-Convex Booms**<br>N. Okuizumi, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; H. Ikuta, S. Hakata, Waseda University, Shinjuku, Japan; M. Natori, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; A. Watanabe, Sakase Adtech Company, Ltd., Sakai, Japan; H. Yamakawa, Waseda University, Shinjuku, Japan | 1530 hrs<br>AIAA-2016-1472<br>**Natural Frequency Optimization and Stability Analysis of Bistable Carbon Fiber Reinforced Plastic Booms for Space Applications**<br>C. Wu, A. Viquerat, G. Aglietti, University of Surrey, Surrey, United Kingdom | 1600 hrs<br>AIAA-2016-1473<br>**Development of Stereo Camera System for Accurate Observation of Large Deployable Membranes in Orbit**<br>Y. Shimoda, K. Watanabe, N. Sakamoto, T. Kuratomi, Y. Naito, WEL Research Company, Ltd., Ichihara, Japan; H. Sakamoto, Tokyo Institute of Technology, Ookayama, Japan; et al. | 1630 hrs<br>AIAA-2016-1474<br>**Effects of Damage on Long Term Displacement Data of Woven Fabric Webbings under Constant Load for Inflatable Structures**<br>W. Kenner, NASA Langley Research Center, Hampton, VA | 1700 hrs<br>AIAA-2016-1475<br>**Non-Axisymmetric Inflatable Pressure Structure (NAIPS) Concept that Enables Mass Efficient Packageable Pressure Vessels with Openings**<br>W. Doggett, T. Jones, J. Watson, J. Warren, NASA Langley Research Center, Hampton, VA; A. Makino, NASA Ames Research Center, Moffett Field, CA; M. Selig, NASA Johnson Space Center, Houston, TX; et al. |

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| **310-SD-8** | **Passive Control and Damping** | | | | | **Balboa C** |
| Chaired by: R. MALLA, University of Connecticut and H. KIM, Boeing Defense, Space & Security | | | | | | |
| 1400 hrs<br>AIAA-2016-1476<br>**Damping of Sandwich Panels via Acoustic Metamaterials**<br>T. Yu, G. Lesieutre, Pennsylvania State University, University Park, PA | 1430 hrs<br>AIAA-2016-1477<br>**Finite Element Modeling of Longitudinal Metastructures for Passive Vibration Suppression**<br>K. Reichl, D. Inman, University of Michigan, Ann Arbor, Ann Arbor, MI | 1500 hrs<br>AIAA-2016-1478<br>**Design of Three Parameter Isolator for the RWA Disturbance Considering Flexible Structural Effects**<br>G. Park, Korea Advanced Institute of Science and Technology, Daejeon, South Korea ; D. Lee, Agency for Defense Development, Daejeon, South Korea ; J. Han, Korea Advanced Institute of Science and Technology, Daejeon, South Korea | 1530 hrs<br>AIAA-2016-1479<br>**Finite Element Modeling of Fluidic Flexible Matrix Composite ($F^2MC$) Treatments for Bending and Torsional Vibration Control**<br>M. Krott, K. Miura, C. Rahn, E. Smith, Pennsylvania State University, University Park, PA | 1600 hrs<br>AIAA-2016-1480<br>**Cellular Lattices with an Internal Topology for High Stiffness and Damping**<br>M. DiPalma, F. Gandhi, Rensselaer Polytechnic Institute, Troy, NY | 1630 hrs<br>AIAA-2016-1481<br>**Structural dynamics analysis and passive control of wind turbine vibrations with Tuned Mass Damper (TMD) technique**<br>T. Farsadi, A. Kayran, Middle East Technical University, Ankara, Turkey | 1700 hrs<br>AIAA-2016-1482<br>**Interfacial Micromechanics and Load Transfer of Off-Aligned Nanocomposites**<br>R. Kopp, Pennsylvania State University, University Park, PA; B. Glaz, J. Riddick, Army Research Laboratory, Aberdeen Proving Ground, MD; E. Smith, Pennsylvania State University, University Park, PA |

| Wednesday, 6 January 2016 | | | | | | |
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| **311-SD-9** | **Gust Loads, Response, and Control** | | | | | **Gaslamp A** |
| Chaired by: D. RAVEH and I. YUNIS, NASA-Langley Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-1483<br>**Probabilistic Gust Loads Analysis Accounting for Aeroservoelastic System Uncertainty**<br>S. Wu, E. Livne, University of Washington, Seattle, Seattle, WA | 1430 hrs<br>AIAA-2016-1484<br>**Gust Reconstruction from Flight Data Recording via Numerical Optimisation**<br>S. Simeone, C. Agostinelli, T. Rendall, University of Bristol, Bristol, United Kingdom; A. Rampurawala, Airbus, Toulouse, France | 1500 hrs<br>AIAA-2016-1485<br>**Reduced Order Gust Response Simulation using Computational Fluid Dynamics**<br>P. Bekemeyer, S. Timme, University of Liverpool, Liverpool, United Kingdom | 1530 hrs<br>AIAA-2016-1486<br>**Aeroservoelastic Response of Nonlinear Wind Tunnel Model to Non-Uniform Gust Field**<br>R. Veiberman, M. Weiss, M. Karpel, Technion-Israel Institute of Technology, Haifa, Israel; F. Fonte, L. Travaglini, S. Ricci, Technical University of Milan, Milan, Italy | 1600 hrs<br>AIAA-2016-1487<br>**Adaptive Finite Element in Time Method for Rotorcraft Analysis Using Element Size Control**<br>S. Kwon, I. Chopra, S. Lee, University of Maryland, College Park, College Park, MD | 1630 hrs<br>AIAA-2016-1488<br>**Derived Gust Velocities Extracted from Flight Data for Various Aircraft**<br>K. Rokhsaz, L. Kliment, Wichita State University, Wichita, KS | 1700 hrs<br>AIAA-2016-1489<br>**Examination of Methods to Separate Gust and Maneuver Load Factors**<br>L. Kliment, K. Rokhsaz, Wichita State University, Wichita, KS |

| Wednesday, 6 January 2016 | | | | | | |
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| **312-SEN-2** | **Novel Sensor Systems and Sensing Techniques II** | | | | | **Regatta C** |
| Chaired by: G. FASANO, University of Naples and D. FAULK, Lockheed Martin Aeronautics | | | | | | |
| 1400 hrs<br>AIAA-2016-1490<br>**Psychophysiological Sensing and State Classification for Attention Management in Commercial Aviation**<br>A. Harrivel, C. Liles, C. Stephens, K. Ellis, L. Prinzel, A. Pope, NASA Langley Research Center, Hampton, VA | 1430 hrs<br>AIAA-2016-1491<br>**Vision-aided Cooperative Navigation for UAV Swarms**<br>A. Vetrella, G. Fasano, D. Accardo, University of Naples "Federico II", Naples, Italy | 1500 hrs<br>AIAA-2016-1492<br>**Multi-band Sensor for Exoplanet Detection to be Installed Onboard Cubesat**<br>I. Marcella, G. Rufino, D. Accardo, University of Naples "Federico II", Naples, Italy; E. Oliva, A. Tozzi, National Institute for Astrophysics, Florence, Italy | 1530 hrs<br>AIAA-2016-1493<br>**Multiple-Target Tracking Framework for Aircraft in Airport Ramp Area**<br>V. Vaddi, P. Dutta, H. Lu, J. Tsai, Optimal Synthesis, Inc., Los Altos, CA | 1600 hrs<br>AIAA-2016-1494<br>**Networked Cooperative Swarm System for Area Denial Operations**<br>M. Anderson, J. Rios, D. Stone, J. Cuany, C. Rasmussen, L. Hale, U.S. Air Force Academy, Colorado Springs, CO | 1630 hrs<br>AIAA-2016-1495<br>**RF Network Localization Method for Unmanned Robotics Systems**<br>S. Kahnemouyi, A. Pourshafiee, N. Cramer, H. Kassamnath, K. Obraczka, M. Teodorescu, University of California, Santa Cruz, Santa Cruz, CA | |

| Wednesday, 6 January 2016 | | |
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| **313-SOF-6/UMS-7/IS-8**<br>**1400 - 1730 hrs** | **Assurance of Autonomy Symposium II** | **Coronado A** |

Methods for Enabling Autonomy

In this session, we discuss current and upcoming techniques that are driving autonomous system development in aviation and the need for new assurance techniques in order to enable greater assured functionality for autonomous systems. Topics that will be addressed include the design, manufacture, fielding, maintenance and retirement of autonomous systems, including relevant elements such as COA/Certification and regulatory approval. Architectures for autonomy will also be discussed.

We begin the session with subject matter expert talks, addressing the issues inherent in designing and fielding multiple types of autonomous platforms with differing mission capabilities and assurance levels. We will then form moderated breakout groups organized by tools, techniques, capabilities and barriers.

1400 - 1500 hrs Speakers

**John Valasek**
Director of the Center for Autonomous Vehicles and Sensor Systems
Texas A&M University

**Eric Johnson**
Lockheed Martin Associate Professor of Avionics Integration
Georgia Institute of Technology

1515 - 1730 hrs Breakout Session

We request that the audience help us in exhaustively exploring the capabilities uniquely enabled by autonomy in aviation systems, the current new hardware and mathematical and computational techniques that are enabling this autonomy, and the barriers to assurance. The results of the breakout will be used to generate a report regarding critical needs as well as competencies required to enable assured autonomy. We will also schedule Thursday lightning-fast talks for audience members who are inspired by the day's proceedings.

| Wednesday, 6 January 2016 | | | | | | |
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| **314-STR-10** | **Design, Test and Analysis of Composite Structures II** | | | | | **La Jolla A** |
| Chaired by: J. MIN, NASA Glenn Research Center and O. ZHUPANSKA, The University of Iowa | | | | | | |
| 1400 hrs<br>AIAA-2016-1496<br>**Ultra-Flexible Advanced Stiffness Truss (U-FAST) for Large Solar Arrays**<br>J. Mejia-Ariza, L.Garde, Inc., Tustin, CA; T. Murphey, Opterus Research and Development, Inc., Syracuse, NY | 1430 hrs<br>AIAA-2016-1497<br>**Optimization of a Composite Lattice Satellite Central Cylinder Structure Using an Efficient Semi-automated Approach**<br>L. Pavlov, B. Smeets, S. Simonian, I. te Kloeze, ATG Europe, Noordwijk, The Netherlands | 1500 hrs<br>AIAA-2016-1498<br>**Imperfection Insensitivity Analyses of Advanced Composite Tow-Steered Shells**<br>K. Wu, NASA Langley Research Center, Hampton, VA; B. Farrokh, NASA Goddard Space Flight Center, Greenbelt, MD; B. Stanford, NASA Langley Research Center, Hampton, VA; P. Weaver, University of Bristol, Bristol, United Kingdom | 1530 hrs<br>AIAA-2016-1499<br>**Modeling the Bistability of Laminated Composite Toroidal Slit Tubes**<br>G. Knott, A. Viquerat, University of Surrey, Guildford, United Kingdom | 1600 hrs<br>AIAA-2016-1500<br>**Vibrational Analysis of Unitized Curvilinearly Stiffened Composite Panels Subjected to In-plane Loads**<br>W. Zhao, R. Kapania, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1630 hrs<br>AIAA-2016-1501<br>**Adhesive-Bonded Shape Memory Alloy Strip Joint for Composite Fan Blade Shape Changing Concept**<br>J. Min, T. Williams, NASA Glenn Research Center, Cleveland, OH | |

| Wednesday, 6 January 2016 | | | | | | |
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| **315-STR-11** | **Structural Joints and Repairs** | | | | | **La Jolla B** |
| Chaired by: S. TERMAATH, University of Tennessee and D. NORWOOD, Lockheed Martin Aeronautics | | | | | | |
| 1400 hrs<br>AIAA-2016-1502<br>**Analytical and Experimental Studies on Delamination Arrest in Bolted-Bonded Composite Structures**<br>L. Richard, K. Lin, University of Washington, Seattle, Seattle, WA | 1430 hrs<br>AIAA-2016-1503<br>**Delamination Growth of Redundantly Joined Sandwich Composites Under Compression**<br>C. Phan, E. Lundgren, D. Patel, V. Goyal, The Aerospace Corporation, El Segundo, CA | 1500 hrs<br>AIAA-2016-1504<br>**Sensitivity Analysis of Composite Patch Design Parameters under Low Velocity Impact Loading Conditions**<br>S. TerMaath, R. Timilsina, University of Tennessee, Knoxville, Knoxville, TN | 1530 hrs<br>AIAA-2016-1505<br>**Non-linear finite element analysis for progressive failure prediction of composite bolted joints**<br>M. Palwankar, A. Popescu, S. Venkataraman, San Diego State University, San Diego, CA | 1600 hrs<br>AIAA-2016-1506<br>**A Method for Predicting Fastener Hole Elongation in Composite Joints due to Cyclic Loading**<br>J. Bartley-Cho, D. Wang, B. Sheppard, T. Palm, Northrop Grumman Corporation, Redondo Beach, CA; R. Holzwarth, M. Wilkinson, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1630 hrs<br>AIAA-2016-1507<br>**High Fidelity Bearing and Bypass Response and Failure Prediction of Composite Bolted Joints**<br>N. Simon, E. Fang, J. Lua, Global Engineering and Materials, Inc., Princeton, NJ | |

| Wednesday, 6 January 2016 | | | | | | |
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| **316-SUR-2** | **Air and Space Survivability II** | | | | | **Old Town A** |
| Chaired by: E. FAHRENTHOLD, University of Texas and J. RIMOLI, Georgia Institute of Technology | | | | | | |
| 1400 hrs<br>AIAA-2016-1508<br>**Multiscale Simulation of Reacting Shock Physics**<br>E. Fahrenthold, S. Lee, J. Bass, University of Texas, Austin, Austin, TX | 1430 hrs<br>AIAA-2016-1509<br>**Topology Optimization of a Penetrating Warhead**<br>W. Graves, D. Liu, A. Palazotto, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1500 hrs<br>AIAA-2016-1510<br>**Dynamic Properties of Additively Manufactured 15-5 Stainless Steel and Three-Dimensional Microstructure Characterization**<br>A. Dempsey, D. Liu, A. Palazotto, Air Force Institute of Technology, Wright-Patterson AFB, OH; R. Abrahams, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1530 hrs<br>AIAA-2016-1511<br>**On tensegrity structural dynamics, reliability, and survivability**<br>J. Rimoli, Georgia Institute of Technology, Atlanta, GA | 1600 hrs<br>AIAA-2016-1512<br>**Surface Roughness of Electron Beam Melting Ti-6Al-4v Effect on Ultrasonic Testing**<br>E. Hanks, D. Liu, A. Palazotto, Air Force Institute of Technology, Wright-Patterson AFB, OH | | |

| Wednesday, 6 January 2016 | | | | | | |
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| **317-TP-8** | **Thermal Protection System, Ablation and Surface Catalysis II** | | | | | **Harbor G** |
| Chaired by: E. STERN, University of Minnesota and M. HOWARD, Sandia National Laboratories | | | | | | |
| 1400 hrs<br>AIAA-2016-1513<br>**Thermogravimetric Analysis of Flexible Thermal Protection Systems for Thermal Response Modeling**<br>G. Rossman, R. Braun, Georgia Institute of Technology, Atlanta, GA | 1430 hrs<br>AIAA-2016-1514<br>**Thermal Ablation Modeling for Silicate Materials**<br>Y. Chen, NASA Ames Research Center, Moffett Field, CA | 1500 hrs<br>AIAA-2016-1515<br>**Investigation of Performance Envelope for Phenolic Impregnated Carbon Ablator (PICA)**<br>P. Agrawal, D. Prabhu, ERC Inc., Moffett Field, CA; T. Squire, F. Milos, M. Stackpoole, NASA Ames Research Center, Moffett Field, CA | 1530 hrs<br>AIAA-2016-1516<br>**Characterization of Candidate Materials for Remote Recession Measurements of Ablative Heat Shield Materials**<br>B. Butler, M. Winter, F. Panerai, A. Martin, S. Bailey, University of Kentucky, Lexington, Lexington, KY; M. Stackpoole, NASA Ames Research Center, Moffett Field, CA; et al. | 1600 hrs<br>AIAA-2016-1517<br>**Predicting the Combined Optical and Thermal Response of Polymer Matrix Composites with Varying Composite Properties**<br>T. Godar, University of Dayton Research Institute, Dayton, OH; B. Volk , G. Ehlert, Air Force Research Laboratory, Wright-Patterson AFB, OH; W. Kennedy , Universal Technology Corporation, Dayton, OH; G. Frank, University of Dayton Research Institute, Dayton, OH | 1630 hrs<br>AIAA-2016-1518<br>**Thermal Testing of Ablators in the NASA Johnson Space Center Radiant Heat Test Facility**<br>S. Del Papa, NASA Johnson Space Center, Houston, TX; J. Milhoan, Barrios Technology, Houston, TX; B. Remark, NASA Johnson Space Center, Houston, TX; L. Suess, Jacobs, Houston, TX | |

| Wednesday, 6 January 2016 | | | | | | |
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| **318-WE-7** | **Wind Energy: Wind Turbine Wakes** | | | | | **Harbor I** |
| Chaired by: P. MORIARTY, National Renewable Energy Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-1519<br>**Megawatt Wind Turbine Far Wake and Performance Predictions Using the Unsteady Actuator Line Model**<br>M. Darbandi, A. Behrouzifar, R. Jalali, Sharif University of Technology, Tehran, Iran ; G. Schneider, University of Waterloo, Waterloo, Canada | 1430 hrs<br>AIAA-2016-1520<br>**Wake Interaction Effects Using a Parallelized Free Vortex Wake Model**<br>K. Shaler, K. Kecskemety, J. McNamara, Ohio State University, Columbus, OH | 1500 hrs<br>AIAA-2016-1521<br>**Scaled Aerodynamic Wind Turbine Design for Wake Similarity**<br>C. Kelley, D. Maniaci, B. Resor, Sandia National Laboratories, Albuquerque, NM | 1530 hrs<br>AIAA-2016-1522<br>**Wake flow characteristics at high wind speed**<br>H. Madsen, T. Larsen, G. Larsen, K. Hansen, Technical University of Denmark, Roskilde, Denmark | 1600 hrs<br>AIAA-2016-1523<br>**Wind tunnel tests on controllable model wind turbines in yaw**<br>J. Schottler, A. Hölling, J. Peinke, M. Hölling, ForWind Center for Wind Energy Research, Oldenburg, Germany | 1630 hrs<br>AIAA-2016-1524<br>**Field Demonstration of the Sandia Wake Imaging System Capabilities at the Scaled Wind Farm Technology Facility**<br>T. Herges, D. Bossert, R. Schmitt, M. Johnson, D. Maniaci, C. Glen, Sandia National Laboratories, Albuquerque, NM; et al. | |

| Wednesday, 6 January 2016 | | |
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| **319-NW-12**<br>**1530 - 1600 hrs** | **Wednesday Afternoon Networking Coffee Break** | **Exposition Hall** |

| Wednesday, 6 January 2016 | | |
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| **320-LEC-8**<br>**1800 - 1900 hrs** | **SDM Lecture** | **Seaport F-G** |
| *Real Life Problems are Multi-Disciplinary*<br>**Ivatury Raju**<br>Technical Fellow for Structures<br>NASA | | |

| Wednesday, 6 January 2016 | | |
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| **321-FD-60**<br>**1830 - 2200 hrs** | **Transition Open Forum** | **Old Town B** |

| Thursday, 7 January 2016 | | |
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| 322-NW-13<br>0700 - 0730 hrs | Thursday Early Morning Networking Coffee Break | Session Room Foyers |

| Thursday, 7 January 2016 | | |
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| 323-SB-4<br>0730 - 0800 hrs | Thursday Morning Speakers' Briefing | Session Rooms |

| Thursday, 7 January 2016 | | |
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| 324-PLNRY-4<br>0800 - 0900 hrs | Thursday Morning Plenary Panel<br><br>Aerospace Frontiers – Strengthening Collaboration, For Continued Progress | Seaport A-E |

Moderator: John Tracy, Chief Technology Officer and Senior Vice President, Engineering, Operations and Technology, The Boeing Company

Panelists:

**Sandy Magnus**
Executive Director
AIAA

**Jaiwon Shin**
Associate Administrator, Aeronautics Research Mission Directorate
NASA

**Morteza Gharib**
Hans W. Liepman Professor of Aeronautics and Bioinspired EngineeringVice Provost
California Institute of Technology

**Steve Walker**
Deputy Director
DARPA

**Darryll Pines**
Professor
University of Maryland

**Keoki Jackson**
Chief Technology Officer
Lockheed Martin Corporation

| Thursday, 7 January 2016 | | | | | | |
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| 325-ACD-8 | Unmanned Aerial Vehicle Design | | | | | Cortez Hill A |
| Chaired by: G. CROUSE, Sierra Nevada Corporation and M. LOGAN, NASA Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-1525<br>**Design of a Recharge Station for UAVs using Non-Contact Wireless Power Transfer**<br>C. Bil, M. Simic, V. Vojisavljevic, RMIT University, Melbourne, Australia | 0930 hrs<br>AIAA-2016-1526<br>**Design and Performance of a Flexible Aircraft Manufacturing Platform**<br>T. Tao, R. Hansman, Massachusetts Institute of Technology, Cambridge, MA | 1000 hrs<br>AIAA-2016-1527<br>**A Novel Sea Launch and Recovery Concept for fixed wing UAVs**<br>N. Sarigul-Klijn, M. Sarigulklijn, University of California, Davis, Davis, CA | 1030 hrs<br>AIAA-2016-1528<br>**Propulsion System Selection and Modeling for a Quadrotor with Search and Rescue Mission**<br>O. Tekinalp, A. Kutay, D. Kaya, D. Kurtulus, Middle East Technical University, Ankara, Turkey; I. Simsek, S. Soysal, GATE Electronics, Ankara, Turkey; et al. | | | |

| Thursday, 7 January 2016 | | |
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| 326-ACD-9<br>0900 - 1200 hrs | Conceptual Aircraft Design Working Group 21, CADWG | Hillcrest D |

| Thursday, 7 January 2016 | | | | | | |
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| **327-AFM-10** | **Small/Mini/Micro Aerial Vehicles** | | | | | **Hillcrest B** |
| Chaired by: K. CUNNINGHAM, NASA Langley Research Center and B. JOLLY, US Air Force | | | | | | |
| 0900 hrs<br>AIAA-2016-1529<br>**A Time-Scale Separation Approach for Time-Varying Model Identification of a Flapping-Wing Micro Aerial Vehicle**<br>S. Armanini, C. de Visser, G. de Croon, M. Mulder, Delft University of Technology, Delft, The Netherlands | 0930 hrs<br>AIAA-2016-1530<br>**Experimental characterization of a small and micro unmanned aerial vehicle propulsion systems**<br>R. Fabela, C. Santana, A. Naranjo, L. Amezquita-Brooks, E. Liceaga-Castro, M. Torres-Reyna, Autonomous University of Nuevo León, Monterrey, Mexico | 1000 hrs<br>AIAA-2016-1531<br>**Gust Detection and Mitigation on a Quad Rotor Biplane**<br>D. Yeo, V. Hrishikeshavan, I. Chopra, University of Maryland, College Park, College Park, MD | 1030 hrs<br>AIAA-2016-1532<br>**Automatic Path Generation for Multirotor Descents Through Varying Air Masses above Ascension Island**<br>C. Greatwood, T. Richardson, J. Freer, University of Bristol, Bristol, United Kingdom; R. Thomas, University of Birmingham, Birmingham, United Kingdom; E. Nisbet, Royal Holloway, London, United Kingdom | 1100 hrs<br>AIAA-2016-1533<br>**Flow interaction between dissimilar UAVs in rendezvous conditions**<br>X. Bovier-Lapierre, V. Jouffroy, Institut Polytechnique des Sciences Avancées, Ivry-sur-Seine, France; T. Richer, Institut Polytechnique des Sciences Avancées, Brest, France; O. Ariff, University of Salford, Salford, United Kingdom | | |

| Thursday, 7 January 2016 | | | | | | |
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| **328-AFM-11** | **Aerodynamic Prediction Methods, Aircraft Flight Dynamics, Handling Qualities, and Performance** | | | | | **Harbor A** |
| Chaired by: A. DA RONCH, University of Southampton and T. LAVIN, Sandia National Laboratories | | | | | | |
| 0900 hrs<br>AIAA-2016-1534<br>**Aircraft Parameter Estimation Using Optimal Control Methods**<br>C. Göttlicher, M. Gnoth, M. Bittner, F. Holzapfel, Technical University of Munich, Munich, Germany | 0930 hrs<br>AIAA-2016-1535<br>**Determination of Water Droplet Collection Efficiency: An Empirical Approach**<br>M. Ali, Georgia Institute of Technology, Atlanta, GA; Q. Ejaz Ur Rehman, S. Chaudhry, Institute of Space Technology, Islamabad, Pakistan | 1000 hrs<br>AIAA-2016-1536<br>**CFD Calculation of Stability and Control Derivatives For Ram-Air Parachutes**<br>M. Ghoreyshi, U.S. Air Force Academy, Colorado Springs, CO; K. Bergeron, Army Research, Development and Engineering Command, Natick, MA; A. Lofthouse, R. Cummings, U.S. Air Force Academy, Colorado Springs, CO | 1030 hrs<br>AIAA-2016-1537<br>**Release Point Determination and Dispersion Reduction for Ballistic Airdrops**<br>J. Vandermey, D. Doman, A. Gerlach, Air Force Research Laboratory, Wright-Patterson AFB, OH | | |

| Thursday, 7 January 2016 | | | | | | |
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| **329-AMT-7** | **Error Sources and Calibration of Instruments** | | | | | **Harbor D** |
| Chaired by: G. JONES, NASA-Langley Research Center and P. BARDET, George Washington University | | | | | | |
| 0900 hrs<br>AIAA-2016-1538<br>**A New Load Residual Threshold Definition for the Evaluation of Wind Tunnel Strain-Gage Balance Data**<br>N. Ulbrich, T. Volden, Jacobs, Moffett Field, CA | 0930 hrs<br>AIAA-2016-1539<br>**Optimal Filtering of Hotwire Anemometry Data Using Multi-Level Wavelet Decomposition**<br>I. Choutapalli , University of Texas, Rio Grande Valley, Edinburg, TX; T. Reynolds, R. Guyton, C. Tilmann, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1000 hrs<br>AIAA-2016-1540<br>**Aerodynamic Parameter Prediction on a Airfoil with Flap via Artificial Hair Sensors and Feedforward Neural Network**<br>K. Thapa Magar, Wright State Research Institute, Beavercreek, OH; G. Reich, M. Rickey, B. Smyers, Air Force Research Laboratory, Wright-Patterson AFB, OH; R. Beblo, University of Dayton Research Institute, Dayton, OH | 1030 hrs<br>AIAA-2016-1541<br>**A Development of Dynamic Wind Tunnel Testing Technique by Using a Magnetic Suspension and Balance System**<br>R. Oshima, H. Sawada, S. Obayashi, Tohoku University, Sendai, Japan | | |

| Thursday, 7 January 2016 | | | | | | |
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| **330-APA-32** | **Special Session: Aerodynamic Design Optimization Benchmark Problems II** | | | | | **Coronado D** |
| Chaired by: J. HICKEN, Rensselaer Polytechnic Institute and T. RENDALL, University of Bristol | | | | | | |
| 0900 hrs<br>AIAA-2016-1542<br>**Application of Multifidelity Optimization Techniques to Benchmark Aerodynamic Design Problems**<br>J. Ren, A. Thelen, A. Amrit, X. Du, L. Leifsson, Iowa State University, Ames, IA; Y. Tesfahunegn, Reykjavik University, Reykjavik, Iceland; et al. | 0930 hrs<br>AIAA-2016-1543<br>**Application of OPTIMENGA Software to Multi-point Multi-constrained Aerodynamic Design**<br>B. Epstein, Academic College of Tel Aviv-Yaffo, Tel Aviv, Israel; S. Peigin, OPTIMENGA-777, Moscow, Russia | 1000 hrs<br>Oral Presentation<br>**A Global and Gradient Based Optimization Study of the AIAA Aerodynamic Design Optimization Discussion Group Test Cases 4 and 5**<br>S. LeDoux, D. Young, R. Melvin, W. Huffman, J. Elliott, B. Basom, The Boeing Company, Seattle, WA; et al. | 1030 hrs<br>AIAA-2016-1544<br>**Impact of Shape Parameterisation on Aerodynamic Optimisation of Benchmark Problem**<br>D. Masters, D. Poole, University of Bristol, Bristol, United Kingdom; N. Taylor, MBDA, Bristol, United Kingdom; T. Rendall, C. Allen, University of Bristol, Bristol, United Kingdom | 1100 hrs<br>AIAA-2016-1545<br>**Multi-round Surrogate-based Optimization for Benchmark Aerodynamic Design Problems**<br>Y. Zhang, Z. Han, L. Shi, W. Song, Northwestern Polytechnical University, Xi'an, China | 1130 hrs<br>Oral Presentation<br>**NASA Common Research Model redesign using adjoint-based methods on unstructured meshes**<br>F. Palacios, J. Vassberg, The Boeing Company, Long Beach, CA; T. Economon, J. Alonso, Stanford University, Stanford, CA; T. Albring, N. Gauger, Technical University of Kaiserslautern, Kaiserslautern, Germany | 1200 hrs<br>**Aerodynamic Design Optimization Benchmark Problems (Discussion)**<br>1Hour Discussion |

| Thursday, 7 January 2016 | | | | | | |
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| **331-APA-33** | **Applied CFD & Numerical Correlations with Experimental Data III** | | | | | **Americas Cup D** |
| Chaired by: C. KIRIS, NASA Ames Research Center and S. MASSEY, NASA-Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-1546<br>**CFD Validation of Interaction of Fin Trailing Vortex with Downstream Control Surface in High Subsonic Flow**<br>J. DeSpirito, Army Research Laboratory, Aberdeen Proving Ground, MD | 0930 hrs<br>AIAA-2016-1547<br>**prediction of iced airfoil aerodynamic characteristics**<br>M. Costes, F. Moens, ONERA, Meudon, France; V. Brunet, Safran Group, Magny les Hameaux, France | 1000 hrs<br>AIAA-2016-1548<br>**Simulation of a Hammerhead Payload Fairing in the Transonic Regime**<br>S. Murman, L. Diosady, NASA Ames Research Center, Moffett Field, CA | 1030 hrs<br>AIAA-2016-1549<br>**Effects of Different Geometries of leading edge on Boundary Layer Transition**<br>D. Bhatia, Kingston University, London, United Kingdom; G. Yang, J. Sun, Northwestern Polytechnical University, Xi'an, China; J. Wang, P. Barrington, Kingston University, London, United Kingdom; H. Li, Northwestern Polytechnical University, Xi'an, China | | | |

| Thursday, 7 January 2016 | | | | | | |
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| **332-APA-34** | **Aerodynamic-Structural Dynamics Interactions I** | | | | | **Americas Cup B** |
| Chaired by: C. PASILIAO, AFRL/RWWV and A. VANDERWYST, Leidos | | | | | | |
| 0900 hrs<br>AIAA-2016-1550<br>**Methodology Development for Coupled Aeroelastic Analysis of Wing Flutter**<br>W. Yuan, National Research Council Canada, Ottawa, Canada; D. Poirel, Royal Military College of Canada, Kingston, Canada | 0930 hrs<br>AIAA-2016-1551<br>**Numerical Study of Benchmark Super-Critical Wing, BSCW, at Flutter Condition**<br>A. Jirasek, M. Dalenbring, Swedish Defense Research Agency (FOI), Stockholm, Sweden; J. Navratil, Brno University of Technology, Brno, Czech Republic | 1000 hrs<br>AIAA-2016-1552<br>**Initial Investigations of Supercritical Airfoil Dynamic Response due to Transonic Buffet**<br>R. Carrese, P. Marzocca, RMIT University, Bundoora, Australia; O. Levinski, Australian National University, Melbourne, Australia; N. Joseph, Leading Engineering Application Providers, Clayton, Australia | 1030 hrs<br>AIAA-2016-1553<br>**Wind Tunnel Experiments with Flexible Plates in Transonic Flows**<br>E. Jinks, P. Bruce, M. Santer, Imperial College London, London, United Kingdom | 1100 hrs<br>AIAA-2016-1554<br>**Spanwise Variation of Stall Flutter on a Flexible NACA 0018 Finite SpanWing**<br>E. Culler, J. Farnsworth, University of Colorado, Boulder, Boulder, CO; C. Fagley, T. McLaughlin, U.S. Air Force Academy, Colorado Springs, CO | 1130 hrs<br>AIAA-2016-1555<br>**Multi-Objective Aerodynamic-Structural Optimization of Supercritical Wing of Wide Body Aircraft**<br>Z. Tong, Y. Zhang, H. Chen, Tsinghua University, Beijing, China | |

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| **333-APA-35/FD-41** | **Special Session: NASA's Revolutionary Computational Aerosciences II** | | | | | **Coronado E** |
| Chaired by: M. MALIK, NASA-Langley Research Center and J. DEBONIS, NASA Glenn Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-1556<br>**Informing Turbulence Closures With Computational and Experimental Data.**<br>K. Duraisamy, University of Michigan, Ann Arbor, Ann Arbor, MI | 0930 hrs<br>AIAA-2016-1557<br>**The NASA Juncture Flow Experiment: Goals, Progress, and Preliminary Testing (Invited)**<br>C. Rumsey, D. Neuhart, M. Kegerise, NASA Langley Research Center, Hampton, VA | 1000 hrs<br>AIAA-2016-1558<br>**Comparison of Experimental Surface and Flow Field Measurements to Computational Results of the Juncture Flow Model (JFM)**<br>N. Roozeboom, NASA Ames Research Center, Moffett Field, CA; H. Lee, Science and Technology Corporation, Moffett Field, CA; G. Zilliac, T. Pulliam, NASA Ames Research Center, Moffett Field, CA; J. Burces, San Jose State University, San Jose, CA | 1030 hrs<br>AIAA-2016-1559<br>**Model-Invariant Hybrid Computations of Separated Flows for RCA Standard Test Cases (Invited)**<br>S. Woodruff, NASA Langley Research Center, Hampton, VA | 1100 hrs<br>AIAA-2016-1560<br>**Wall-modeled LES in Unstructured Grids: Application to the NASA Wall-mounted Hump**<br>G. Park, Stanford University, Stanford, CA | 1130 hrs<br>AIAA-2016-1561<br>**Comparison of Turbulent Thermal Diffusivity and Scalar Variance Models**<br>D. Yoder, NASA Glenn Research Center, Cleveland, OH | |

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| **334-APA-36** | **Airfoil/Wing/Configuration Aerodynamics I** | | | | | **Americas Cup C** |
| Chaired by: C. ROSEMA, US Army AMRDEC and K. WAITHE, Gulfstream Aerospace Corporation | | | | | | |
| 0900 hrs<br>AIAA-2016-1562<br>**Rigid Ram-Air Parachute Experiments with Bleed Air Vents**<br>J. Seidel, C. Latscha, G. Venkataraman, U.S. Air Force Academy, Colorado Springs, CO; K. Bergeron, Army Research, Development and Engineering Command, Natick, MA; T. McLaughlin, U.S. Air Force Academy, Colorado Springs, CO | 0930 hrs<br>AIAA-2016-1563<br>**Experimental investigation of aerodynamic performance of airfoils fitted with morphing trailing edges**<br>Q. Ai, H. Kamliya Jawahar, M. Azarpeyvand, University of Bristol, Bristol, United Kingdom | 1000 hrs<br>AIAA-2016-1564<br>**Rediscovering the "Peakey Leading Edge": A Study of the Transonic Properties of Classic Airfoils**<br>M. Merrell, T. Takahashi, Arizona State University, Tempe, AZ | 1030 hrs<br>AIAA-2016-1565<br>**Measurements of a Symmetric Wing Morphed by Macro Fiber Composite Actuators**<br>M. Debiasi, W. Chan, National University of Singapore, Singapore, Singapore; S. Jadhav, Birla Institute of Technology & Science, Pilani, Goa, India | 1100 hrs<br>AIAA-2016-1566<br>**Evaluating an Experimental Streamlined Fairing for a Diverterless Supersonic Inlet (DSI) Equipped Aircraft**<br>J. Masud, O. Khan, Air University, Islamabad, Pakistan | | |

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| **335-ASC-5** | **Shape Memory Alloys** | | | | | **Gaslamp D** |
| Chaired by: T. TURNER, NASA-Langley Research Center and E. WHITE, Boeing Engineering Operations & Technology | | | | | | |
| 0900 hrs<br>AIAA-2016-1567<br>**Increased Volume Change in a Shape Memory Alloy Buoyancy Heat Engine using Auxetic Lattice Cylinders**<br>A. Angilella, F. Gandhi, Rensselaer Polytechnic Institute, Troy, NY; T. Miller, Pennsylvania State University, University Park, PA | 0930 hrs<br>AIAA-2016-1568<br>**Experimental Characterization of a Shape Memory Alloy-Based Morphing Radiator**<br>C. Bertagne, J. Chong, D. Hartl, J. Whitcomb, Texas A&M University, College Station, TX; L. Erickson, R. Sheth, NASA Johnson Space Center, Houston, TX | 1000 hrs<br>AIAA-2016-1569<br>**Additive Topological Optimization of Muscular-Skeletal Structures via Genetic L-System Programming**<br>D. Hartl, G. Reich, P. Beran, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1030 hrs<br>AIAA-2016-1570<br>**Synergistic Smart Morphing Alleron: Capabilites Identification**<br>A. Pankonien, L. Gamble, C. Faria, D. Inman, University of Michigan, Ann Arbor, Ann Arbor, MI | | | |

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| **336-DSC-4** | **Aircraft Loads Prediction - Special Session** | | | | | **Gaslamp C** |
| Chaired by: J. COOPER, University of Bristol and K. GRIFFIN, Southwest Research Institute | | | | | | |
| 0900 hrs<br>AIAA-2016-1571<br>**Aircraft Loads Prediction using Enhanced Simulation (ALPES)**<br>J. Cooper, A. Gaitonde, D. Jones, M. Lowenberg, P. Sartor, University of Bristol, Bristol, United Kingdom; Y. Lemmens, Siemens, Leuven, Belgium | 0930 hrs<br>AIAA-2016-1572<br>**Bifurcation Analysis of a Nose Landing Gear System**<br>I. Tartaruga, M. Lowenberg, J. Cooper, P. Sartor, University of Bristol, Bristol, United Kingdom; Y. Lemmens, Siemens, Leuven, Belgium | 1000 hrs<br>AIAA-2016-1573<br>**Nonlinear Static Aeroelasticity of High Aspect Ratio Wing Aircraft by FEM and Multibody methods**<br>M. Castellani, J. Cooper, University of Bristol, Bristol, United Kingdom; Y. Lemmens, Siemens, Leuven, Belgium | 1030 hrs<br>AIAA-2016-1574<br>**Nonlinear Negative Stiffness Wing-Tip Spring Device for Gust Loads Alleviation**<br>A. Castrichini, J. Cooper, University of Bristol, Bristol, United Kingdom; T. Wilson, Airbus, Bristol, United Kingdom; A. Carrella, Y. Lemmens, Siemens, Leuven, Belgium | 1100 hrs<br>AIAA-2016-1575<br>**Doublet-Lattice Method Correction by Means of Linearised Frequency Domain Solver Analysis**<br>C. Valente, D. Jones, A. Gaitonde, J. Cooper, University of Bristol, Bristol, United Kingdom; Y. Lemmens, Siemens, Leuven, Belgium | 1130 hrs<br>AIAA-2016-1576<br>**Frequency Domain Approach for Transonic Aerodynamic Modelling**<br>A. Poncet-Montanges, J. Cooper, D. Jones, A. Gaitonde, University of Bristol, Bristol, United Kingdom; Y. Lemmens, Siemens, Leuven, Belgium | |

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| **337-EDU-1** | **Advancing Aerospace Education I** | | | | | **Bankers Hill** |
| Chaired by: K. RAVINDRA, Parks College of Engineering, Aviation & Technology | | | | | | |
| 0900 hrs<br>AIAA-2016-1577<br>**Model Rocket Projects for Aerospace Engineering Course: Simulation of Flight Trajectories**<br>T. Campbell, S. Seufert, R. Reis, J. Brewer, R. Limberger Tomiozzo, C. Whelan, Catholic University of America, Washington, D.C.; et al. | 0930 hrs<br>AIAA-2016-1578<br>**Model Rocket Projects for Aerospace Engineering Course: Propellant Analyses**<br>J. Brewer, R. Reis, R. Limberger Tomiozzo, M. Okutsu, Catholic University of America, Washington, D.C. | 1000 hrs<br>AIAA-2016-1579<br>**Case Study of Two Capstone Student Projects from Canada and the United Kingdom**<br>C. Ferlisi, C. Mazzini, E. Laurendeau, Defense Research and Development Canada, Montréal, Canada; D. Ramasawmy, A. Da Ronch, O. Stalnov, University of Southampton, Southampton, United Kingdom | 1030 hrs<br>AIAA-2016-1580<br>**Brazilian Space-Tech Vocational Center**<br>E. Gonçalves, C. Veras, Brazilian Space Agency (AEB), Brasilia, Brazil | | | |

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| **338-FD-42** | **CFD: Meshfree Methods and Non-Equilibrium Gas Dynamics** | | | | | **Pier** |
| Chaired by: A. KATZ | | | | | | |
| 0900 hrs<br>AIAA-2016-1581<br>**Development and Validation of a Multi-Strand Solver for Complex Aerodynamic Flows**<br>V. Lakshminarayan, Science and Technology Corporation, Moffett Field, CA; J. Sitaraman, Parallel Geometric Algorithms, LLC, Sunnyvale, CA; B. Roget, Science and Technology Corporation, Moffett Field, CA; A. Wissink, Army Aviation and Missile Research Development and Engineering Center, Moffett Field, CA | 0930 hrs<br>AIAA-2016-1582<br>**Assessment of a Two-Equation Turbulence Model in the High-Order Flux Correction Scheme**<br>O. Tong, C. Blakely, A. Katz, Utah State University, Logan, UT | 1000 hrs<br>AIAA-2016-1583<br>**Simulation of Moving Bodies Using a Meshfree Method**<br>Z. Duan, Z. Wang, University of Kansas, Lawrence, Lawrence, KS; L. Duncil, B. Vu, NASA Kennedy Space Center, Cape Canaveral, FL | 1030 hrs<br>AIAA-2016-1584<br>**Asymptotic Geometry Representation for Complex Configurations**<br>O. Tong, Y. Yanagita, A. Katz, Utah State University, Logan, UT | 1100 hrs<br>AIAA-2016-1585<br>**Finite Element Modeling of Non-equilibrium Gasdynamics Beyond the Continuum Regime**<br>M. Dumas, S. Gao, W. Habashi, M. Fossati, McGill University, Montréal, Canada; G. Baruzzi, D. Isola, ANSYS, Inc., Montréal, Canada; et al. | | |

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| **339-FD-43** | **Experimental Investigations of High-Speed Flow** | | | | | **Harbor F** |
| Chaired by: M. BORG, Air Force Research Laboratory and K. CASPER, Sandia National Laboratories | | | | | | |
| 0900 hrs<br>AIAA-2016-1586<br>**Optical Characterization of Nozzle-Wall Mach-6 Boundary Layers**<br>S. Gordeyev, T. Juliano, University of Notre Dame, Notre Dame, IN | 0930 hrs<br>AIAA-2016-1587<br>**Krypton Tagging Velocimetry (KTV) in Supersonic Turbulent Boundary Layers**<br>D. Zahradka, N. Parziale, Stevens Institute of Technology, Hoboken, NJ; M. Smith, E. Marineau, Arnold Engineering Development Center, Silver Spring, MD | 1000 hrs<br>AIAA-2016-1588<br>**Interactions of Shock Tube Exhaust Flows with Laminar and Turbulent Flames**<br>J. Chan, University of New South Wales, Sydney, Australia; P. Giannuzzi, New Mexico Institute of Mining and Technology, Socorro, NM; K. Kabir, Macquarie University, Sydney, Australia; M. Hargather, New Mexico Institute of Mining and Technology, Socorro, NM; G. Doig, California Polytechnic State University, San Luis Obispo, CA | 1030 hrs<br>AIAA-2016-1589<br>**Flow structure and unsteadiness in the supersonic wake of a generic space launcher**<br>A. Schreyer, S. Stephan, R. Radespiel, Technical University of Braunschweig, Braunschweig, Germany | 1100 hrs<br>AIAA-2016-1590<br>**Turbulence characteristics of supersonic corner flows in a low aspect ratio rectangular channel**<br>R. Morajkar, M. Gamba, University of Michigan, Ann Arbor, Ann Arbor, MI | | |

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| **340-FD-44** | **Multiphase Flow II: Liquid-gas and Engines** | | | | | **Promenade B** |
| Chaired by: C. BOURASSA, GE Aviation and D. TROOLIN, TSI Incorporated | | | | | | |
| 0900 hrs<br>AIAA-2016-1591<br>**Penetration Height of a Circular Liquid Jet in a Subsonic Gaseous Crossflow: An Eulerian-Lagrangian Approach**<br>M. Broumand, M. Farokhi, M. Birouk, University of Manitoba, Winnipeg, Canada | 0930 hrs<br>AIAA-2016-1592<br>**Exploration of Liquid Mass Distribution for Liquid Jets in Subsonic Crossflows Using X-Ray Radiography**<br>K. Lin, Taitech, Inc., Beavercreek, OH; S. Peltier, C. Carter, J. Donbar, Air Force Research Laboratory, Wright-Patterson AFB, OH; A. Kastengren, Argonne National Laboratory, Argonne, IL | 1000 hrs<br>AIAA-2016-1593<br>**Three-dimensional liquid sheet breakup: vorticity dynamics**<br>A. Zandian, W. Sirignano, University of California, Irvine, Irvine, CA; F. Hussain, Texas Tech University, Lubbock, TX | 1030 hrs<br>AIAA-2016-1594<br>**Adaptive simulation of gas-liquid interfacial flows with surface tension**<br>A. Hay, S. Etienne, D. Pelletier, Defense Research and Development Canada, Montréal, Canada | 1100 hrs<br>AIAA-2016-1595<br>**Active Damping of Fuel Slosh Using a Hybrid Magneto-Active Propellant Management Device**<br>L. Paul, B. Sivasubramanian, S. Putheenveed, S. Gangadharan, Embry-Riddle Aeronautical University, Daytona Beach, FL | 1130 hrs<br>AIAA-2016-1596<br>**Influence of Scavenge Geometry on Separation Efficiency for an Inertial Particle Separator**<br>B. Connolly, E. Loth, University of Virginia, Charlottesville, Charlottesville, VA; P. Snyder, C. Smith, Rolls-Royce Group plc, Indianapolis, IN | 1200 hrs<br>AIAA-2016-1597<br>**Large Length-Scale Thermocapillary Flow Experiment Design and Feasibility Analysis for the ISS FIR**<br>S. Alberts, S. Collicott, Purdue University, West Lafayette, IN |

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| **341-FD-45** | **RANS/LES Methods and Techniques II** | | | | | **Harbor E** |
| Chaired by: K. CASSEL, Illinois Institute of Technology | | | | | | |
| 0900 hrs<br>AIAA-2016-1598<br>**A Modified One–Equation Turbulence Model Based on Turbulent Kinetic Energy Equation**<br>M. Rahman, Aalto School of Engineering, Helsinki, Finland; R. Agarwal, Washington University in St. Louis, St. Louis, MO; T. Siikonen, Aalto School of Engineering, Helsinki, Finland | 0930 hrs<br>AIAA-2016-1599<br>**A Hybrid RANS-Implicit LES Approach for the High-Order FR/CPR Method**<br>H. Zhu, S. Fu, Tsinghua University, Beijing, China; L. Shi, Z. Wang, University of Kansas, Lawrence, KS | 1000 hrs<br>AIAA-2016-1600<br>**development of an elliptic-blending lag model for industrial applications**<br>S. Lardeau, CD-adapco, London, United Kingdom; F. Billard, Dassault Group, Saint-Cloud, France | 1030 hrs<br>AIAA-2016-1601<br>**Improvements to SST turbulence model for free shear layers, turbulent separation and stagnation point anomaly**<br>G. Kalitzin, G. Medic, G. Xia, United Technologies Corporation, East Hartford, CT | 1100 hrs<br>AIAA-2016-1602<br>**Unified RANS-LES Simulations of Separated Flow at High Reynolds Number**<br>R. Mokhtarpoor, S. Heinz, M. Stoellinger, University of Wyoming, Laramie, Laramie, WY | | |

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| **342-FD-46** | **Vortex Flows I** | | | | | **Promenade A** |
| Chaired by: K. TAIRA, Florida State University and J. BUCHHOLZ, University of Iowa | | | | | | |
| 0900 hrs<br>AIAA-2016-1603<br>**Characterization of Aircraft Wake Vortex Circulation Decay in Reasonable Worst Case Conditions**<br>I. De Visscher, Wake Prediction Technologies (WaPT), Louvain-la-Neuve, Belgium; V. Treve, EUROCONTROL, Brussels, Belgium; G. Winckelmans, Wake Prediction Technologies (WaPT), Louvain-la-Neuve, Belgium | 0930 hrs<br>AIAA-2016-1604<br>**A Simple Model of Asymmetric Wakes for Periodically Oscillating Airfoils**<br>H. Xuzhao, I. Gursul, University of Bath, Bath, United Kingdom | 1000 hrs<br>AIAA-2016-1605<br>**Response of a Streamwise Vortex/ Wall Interaction to Unsteady Forcing**<br>S. Benton, J. Bons, Ohio State University, Columbus, OH | 1030 hrs<br>AIAA-2016-1606<br>**The Role of Vorticity Transport in the Detachment of Unsteady Leading-Edge Vortices**<br>J. Akkala, J. Buchholz, University of Iowa, Iowa City, IA | 1100 hrs<br>AIAA-2016-1607<br>**Vorticity Generation at Sharp Corners**<br>P. Zhang, K. Mohseni, University of Florida, Gainesville, Gainesville, FL | | |

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| **343-GNC-28** | **Invited Session: Interval Management: Operational Concept, Integration, and Benefits** | | | | | **Coronado B** |
| Chaired by: W. PENHALLEGON, The MITRE Corporation and B. BARMORE | | | | | | |
| 0900 hrs<br>AIAA-2016-1608<br>**Interval Management: Development and Implementation of an Airborne Spacing Concept**<br>B. Barmore, NASA Langley Research Center, Hampton, VA; W. Penhallegon, L. Weitz, R. Bone, MITRE Corporation, McLean, VA; I. Levitt, Federal Aviation Administration, Atlantic City, NJ; J. Flores Kriegsfeld, Federal Aviation Administration, Washington, D.C.; et al. | 0930 hrs<br>AIAA-2016-1609<br>**Concept of Operations for Interval Management Arrivals and Approach**<br>D. Hicok, Regulus Group, Washington, D.C.; B. Barmore, NASA Langley Research Center, Hampton, VA | 1000 hrs<br>AIAA-2016-1610<br>**Modeling Schedule and Mixed Terminal Operations on a Graph Network**<br>I. Levitt, T. Steiner, Federal Aviation Administration, Atlantic City, NJ | 1030 hrs<br>AIAA-2016-1611<br>**Leveraging Interval Management to Improve Air Traffic Operations during Departure**<br>B. Lascara, C. Guensch, L. Weitz, MITRE Corporation, McLean, VA; P. Moertl, ASERS, Graz, Austria | 1100 hrs<br>AIAA-2016-1612<br>**Results from a Field Evaluation of Interval Management during an Optimized Profile Descent Arrival and Approach**<br>W. Penhallegon, R. Bone, H. Stassen, MITRE Corporation, McLean, VA | 1130 hrs<br>AIAA-2016-1613<br>**Interval Management Operations in the Terminal Airspace of Amsterdam Airport Schiphol.**<br>N. De Gelder, National Aerospace Laboratory (NLR), Amsterdam, The Netherlands | 1200 hrs<br>AIAA-2016-1614<br>**ASTAR Flight Test: Overview and Spacing Results**<br>R. Roper, M. Koch, NASA Langley Research Center, Hampton, VA |

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| **344-GNC-29** | **Novel Navigation, Estimation and Tracking I** | | | | | **Hillcrest A** |
| Chaired by: Y. CHENG, Mississippi State University and S. STARIN, NASA-Goddard Space Flight Center | | | | | | |
| 0900 hrs<br>AIAA-2016-1615<br>**Estimation of Gas Concentration from a Moving Source with an Unmanned Aerial Vehicle**<br>T. Egorova, N. Gatsonis, M. Demetriou, Worcester Polytechnic Institute, Worcester, MA | 0930 hrs<br>AIAA-2016-1616<br>**Wind Field Estimation From Airdrop Trajectory Measurements**<br>A. Gerlach, Universal Technology Corporation, Dayton, OH; D. Doman, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1000 hrs<br>AIAA-2016-1617<br>**Practical Observer Design for Real-Time Helicopter Weight Estimation**<br>J. Warner, J. Rogers, Georgia Institute of Technology, Atlanta, GA; N. Phan, Naval Air Systems Command, Patuxent River, MD | 1030 hrs<br>AIAA-2016-1618<br>**Positive Weighted Compact Quadrature Rule for Uncertainty Propagation and Nonlinear Estimation**<br>B. Jia, Intelligent Fusion Technology, Inc., Germantown, MD; M. Xin, University of Missouri, Columbia, Columbia, MO | 1100 hrs<br>AIAA-2016-1619<br>**A General Solution for Update with Out-of-Sequence Measurements: The Augmented Fixed-Lag Smoother**<br>H. Yoon, D. Sternberg, K. Cahoy, Massachusetts Institute of Technology, Cambridge, MA | 1130 hrs<br>AIAA-2016-1620<br>**Suboptimal Gain Functions of Feedback Particle Filter Derived from Continuation Method**<br>Y. Matsuura, R. Ohata, K. Nakakuki, R. Hirokawa, Mitsubishi Group, Kamakura, Japan | |

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| **345-GNC-30/ACD-10** | **Aircraft GNC I** | | | | | **Hillcrest C** |
| Chaired by: H. TAHA, University of California, Irvine and W. WHITACRE, Draper Laboratory | | | | | | |
| 0900 hrs<br>AIAA-2016-1621<br>**Fuel Flow Control for Extending Aircraft Thermal Endurance Part I: Underlying Principles**<br>D. Doman, Air Force Research Laboratory, Wright-Patterson AFB, OH | 0930 hrs<br>AIAA-2016-1622<br>**Fuel Flow Control for Extending Aircraft Thermal Endurance Part II: Closed Loop Control**<br>D. Doman, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1000 hrs<br>AIAA-2016-1623<br>**Model-Based Engine Control Architecture with an Extended Kalman Filter**<br>J. Csank, J. Connolly, NASA Glenn Research Center, Cleveland, OH | 1030 hrs<br>AIAA-2016-1624<br>**$H_\infty$ Loop-Shaping Robust Differential Thrust Control Methodology for Lateral/ Directional Stability of an Aircraft with a Damaged Vertical Stabilizer**<br>L. Lu, K. Turkoglu, San Jose State University, San Jose, CA | 1100 hrs<br>AIAA-2016-1625<br>**Application of a Kalman Filter for Reduction of Sensor/Turbulence-Induced Noise Within a Model Reference Adaptive Controller**<br>M. Rafi, J. Steck, J. Watkins, Wichita State University, Wichita, KS | 1130 hrs<br>AIAA-2016-1626<br>**Optimization of the vertical trajectory through Time and Energy management: A Human-in-the-Loop Study**<br>F. Bussink, R. Verhoeven, A. Marsman, National Aerospace Laboratory (NLR), Amsterdam, The Netherlands ; X. Prats, B. Bendris, Technical University of Catalonia, Barcelona, Spain; J. Montolio, Pildo Labs, Barcelona, Spain; et al. | |

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| **346-GNC-31** | **GNC Concepts in Air Traffic Control** | | | | | **Cortez Hill B** |
| Chaired by: A. CHAKRAVARTHY, Wichita State University | | | | | | |
| 0900 hrs<br>AIAA-2016-1627<br>**A Dynamic Heads-Up Air Traffic Locator & Collision Advisory Display Using Google Glass**<br>M. Rafi, B. Chandrasekaran, M. Kusmez, J. Steck, J. He, Wichita State University, Wichita, KS | 0930 hrs<br>AIAA-2016-1628<br>**Improving Sense and Avoid using Multi-modal Sensor Fusion for Non-communicating Threats**<br>J. Jackson, J. Boskovic, D. Diel, Scientific Systems Company, Inc., Woburn, MA | 1000 hrs<br>AIAA-2016-1629<br>**Three-Dimensional Velocity Obstacle Method for UAV's Uncoordinated Avoidance Maneuver**<br>Y. Jenie, E. Van Kampen, C. de Visser, J. Ellerbroek, J. Hoekstra, Delft University of Technology, Delft, The Netherlands | 1030 hrs<br>AIAA-2016-1630<br>**Encounter Rate Estimation of Continuous Descent Arrival Procedures in Terminal Area**<br>S. Park, Optimal Synthesis, Inc., Los Altos, CA; J. Clarke, E. Feron, H. Jimenez, Georgia Institute of Technology, Atlanta, GA | 1100 hrs<br>AIAA-2016-1631<br>**Separation Assurance and Scheduling Coordination in the Arrival Environment.**<br>A. Aweiss, A. Cone, J. Holladay, E. Munoz, NASA Ames Research Center, Moffett Field, CA; T. Lewis, NASA Langley Research Center, Hampton, VA | | |

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| **347-GT-7** | **Aerodynamic Force Measurement and NFMTC Update (Invited)** | | | | | **Cove** |
| Chaired by: R. RHEW, NASA-Langley Research Center and S. COMMO, NASA Langley Research Center | | | | | | |
| 0900 hrs<br>Oral Presentation<br>**National Force Measurement Technology Capability (NFMTC) Project Update**<br>S. Commo, NASA Langley Research Center, Hampton, VA | 0930 hrs<br>Oral Presentation<br>**Balance In-Situ Load System (ILS) Demonstration Results**<br>K. Toro, NASA Langley Research Center, Hampton, VA | 1000 hrs<br>Oral Presentation<br>**Balance Calibration Study Update**<br>D. Landman, Old Dominion University, Norfolk, VA | 1030 hrs<br>Oral Presentation<br>**On-board Signal Digitization**<br>J. Ponder, NASA Glenn Research Center, Cleveland, OH | 1100 hrs<br>AIAA-2016-1632<br>**Pre-Test Assessment of the Use Envelope of the Normal Force of a Wind Tunnel Strain-Gage Balance**<br>N. Ulbrich, Jacobs, Moffett Field, CA | | |

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| **348-GTE-11** | **Jet Noise** | | | | | **Cortez Hill C** |
| Chaired by: S. GOGINENI, Spectral Energies, LLC and B. KIEL, Air Force Reseach Laboratory | | | | | | |
| 0900 hrs<br>AIAA-2016-1633<br>**Velocity Statistics and Spectra in Three-Stream Jets**<br>T. Ecker, W. Ng, K. Lowe, Virginia Polytechnic Institute and State University, Blacksburg, VA; B. Henderson, NASA Glenn Research Center, Cleveland, OH; S. Leib, Ohio Aerospace Institute, Cleveland, OH | 0930 hrs<br>AIAA-2016-1634<br>**Noisy Flow Structures in a Heated and Unheated Jet Produced by a Three-Stream Rectangular Nozzle with an Aft Deck**<br>C. Ruscher, S. Gogineni, Spectral Energies, LLC, Dayton, OH; B. Kiel, A. Giese, Air Force Research Laboratory, Wright-Patterson AFB, OH; K. Viswanath, Naval Research Laboratory, Washington, D.C. | 1000 hrs<br>AIAA-2016-1635<br>**Perceived Noise Analysis for Offset Jets Applied to Commercial Supersonic Aircraft**<br>D. Huff, B. Henderson, J. Berton, J. Seidel, NASA Glenn Research Center, Cleveland, OH | 1030 hrs<br>AIAA-2016-1636<br>**Characterization of Three-Stream Jet Flow Fields**<br>B. Henderson, M. Wernet, NASA Glenn Research Center, Cleveland, OH | 1100 hrs<br>AIAA-2016-1637<br>**Simple Scaling Of Multi-Stream Jet Plumes For Aeroacoustic Modeling**<br>J. Bridges, NASA Glenn Research Center, Cleveland, OH | 1130 hrs<br>AIAA-2016-1638<br>**Noise Characteristics of a Rectangular vs Circular Nozzle for Ideally Expanded Jet Flow**<br>K. Viswanath, R. Johnson, A. Corrigan, K. Kailasanath, Naval Research Laboratory, Washington, D.C.; P. Mora , F. Baier, University of Cincinnati, Cincinnati, OH; et al. | 1200 hrs<br>AIAA-2016-1639<br>**A near-field investigation of a supersonic, multi-stream jet: locating turbulence mechanisms through velocity and density measurements**<br>A. Magstadt, M. Berry, T. Coleman, P. Shea, M. Glauser, Syracuse University, Syracuse, NY; C. Ruscher, Spectral Energies, LLC, Dayton, OH; et al. |

| Thursday, 7 January 2016 | | | | | | |
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| **349-GTE-12** | **Methodologies for Advanced Components** | | | | | **Golden Hill A** |
| Chaired by: B. SARACOGLU, von Karman Institute for Fluid Dynamics and S. DRENNAN, Convergent Science, Inc. | | | | | | |
| 0900 hrs<br>AIAA-2016-1640<br>**Simple and Robust Framework for Coupled Aerothermal Gas Turbine Simulation using Low-Mach and Compressible Industrial CFD Solvers**<br>P. Legrenzi, K. Kannan, G. Page, Loughborough University, Loughborough, United Kingdom; I. Tristanto, Rolls-Royce Group plc, Derby, United Kingdom | 0930 hrs<br>AIAA-2016-1641<br>**Simulation of Particle flow in Inertial Particle Separator with Eulerian Method of Velocity Re-associated Two-node Quadrature-based Method of Moment**<br>D. Sun, A. Garmory, G. Page, Loughborough University, Loughborough, United Kingdom; I. Tristanto, Rolls-Royce Group plc, Derby, United Kingdom | 1000 hrs<br>AIAA-2016-1642<br>**Mode-Tracking in Surrogate-Based Inverse Identification of Rotor Blade Geometry Using Campbell Diagram**<br>V. Yadav, S. Venkataraman, San Diego State University, San Diego, CA; S. Bland, NextGen Aeronautics, Danville, VA | | | | |

| Thursday, 7 January 2016 | | | | | | |
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| **350-HIS-4** | **Boeing Centennial 1916-2016 II** | | | | | **Americas Cup A** |
| Chaired by: S. MUSI | | | | | | |
| 0900 hrs<br>AIAA-2016-1643<br>**Dyna-Soar: What Might Have Been**<br>J. Tishkoff, Air Force Office of Scientific Research, Arlington, VA | 0930 hrs<br>AIAA-2016-1644<br>**The Road to the Modern Airliners: The first Boeing–Douglas commercial aircraft market battle**<br>M. Lavelle, Great Planes Heritage, Issaquah, WA | 1000 hrs<br>**Discussions on Boeing's 100-year History**<br>Moderator: James Kidrick, President, San Diego Air & Space Museum<br>**Michael Lombardi**<br>Chief Historian<br>The Boeing Company<br>**Tom Crouch**<br>Senior Curator<br>Smithsonian Institution<br>**Mike Lavelle**<br>Aviation Historian<br>**Guy Norris**<br>**Senior Editor**<br>Aviation Week<br>Closing Remarks<br>**John Tracy**<br>Chief Technology Officer<br>The Boeing Company | | | | |

| Thursday, 7 January 2016 | | | | | | |
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| **351-HSABP-6** | **Advances in Pressure Gain Combustion III - RDE, PDE, & Pulse Combustion** | | | | | **Regatta A** |
| Chaired by: S. CLAFLIN, Aerojet Rocketdyne and D. PAXSON, NASA Glenn Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-1645<br>**Enhanced Combustion in Supersonic Flows Using a Pulsed Detonation**<br>Y. Abul-Huda, M. Gamba, University of Michigan, Ann Arbor, Ann Arbor, MI | 0930 hrs<br>AIAA-2016-1646<br>**The Rayleigh Efficiency of Pressure Gain Combustors**<br>R. Blackburn, R. Miller, University of Cambridge, Cambridge, United Kingdom | 1000 hrs<br>AIAA-2016-1647<br>**Impact of an Exhaust Throat on Semi-Idealized Rotating Detonation Engine Performance**<br>D. Paxson, NASA Glenn Research Center, Cleveland, OH | 1030 hrs<br>AIAA-2016-1648<br>**High-Repetition-Rate Chemiluminescence Imaging of a Rotating Deotonation Engine**<br>K. Cho, J. Codoni, B. Rankin, J. Hoke, F. Schauer, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1100 hrs<br>AIAA-2016-1649<br>**Efficacy of Acoustics in Determining the Operating Mode of a Rotating Detonation Engine**<br>N. Pandiya, A. St. George, R. Driscoll, V. Ganesh Kumar, B. Malla, E. Gutmark, University of Cincinnati, Cincinnati, OH | 1130 hrs<br>AIAA-2016-1650<br>**Investigation of a Rotating Detonation Engine using Ethylene-Air Mixture**<br>J. Wilhite, R. Driscoll, A. St. George, V. Ganesh Kumar, E. Gutmark, University of Cincinnati, Cincinnati, OH | |

| Thursday, 7 January 2016 | | | | | | |
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| **352-IS-9** | **Intelligent Human-Automation Interaction** | | | | | **Regatta B** |
| Chaired by: M. GOMBOLAY, MIT and J. SHAH, MIT - Massachusetts Institute of Technology and A. STIMPSON | | | | | | |
| 0900 hrs<br>AIAA-2016-1651<br>**Towards Self-Confidence in Autonomous Systems**<br>N. Sweet, N. Ahmed, University of Colorado, Boulder, Boulder, CO; U. Kuter, C. Miller, Smart Information Flow Technologies, Minneapolis, MN | 0930 hrs<br>AIAA-2016-1652<br>**Functional Requirements for Onboard Intelligent Automation in Single Pilot Operations**<br>M. Cummings, A. Stimpson, M. Clamann, Duke University, Durham, NC | 1000 hrs<br>AIAA-2016-1653<br>**Cooperative Search Using Human-UAV Teams**<br>C. Liu, J. Hedrick, University of California, Berkeley, Berkeley, CA | | | | |

| Thursday, 7 January 2016 | | | | | | |
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| **353-MAT-9** | **Materials & Design for Additive Manufacturing** | | | | | **Gaslamp B** |
| Chaired by: S. WANTHAL, The Boeing Company and T. CLEMENT, Raytheon | | | | | | |
| 0900 hrs<br>AIAA-2016-1654<br>**Cathodic Protection Tests for the Galvanic Corrosion of Airframe Grade CFRP/Al Systems**<br>T. Morimoto, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; J. Koyanagi, Tokyo University of Science, Katsushika, Japan | 0930 hrs<br>AIAA-2016-1655<br>**Fire-Retardant Polyamide 11 Nanocomposites/Elastomer Blends for Selective Laser Sintering: Further Studies**<br>R. Ortiz, H. Wu, J. Koo, University of Texas, Austin, Austin, TX | 1000 hrs<br>AIAA-2016-1656<br>**On the Fatigue Performance of Additively Manufactured Ti-6Al-4V to Enable Rapid Qualification for Aerospace Applications**<br>P. Li, D. Warner, Cornell University, Ithaca, NY; A. Fatemi , University of Toledo, Toledo, OH; N. Phan, Naval Air Systems Command, Lexington Park, MD | 1030 hrs<br>AIAA-2016-1657<br>**Powder Bed Models – Numerical Assessment of As-Built Quality**<br>M. Megahed, H. Mindt, B. Shula, ESI Group, Farmington Hills, MI; A. Peralta, J. Neumann, Honeywell International, Inc., Phoenix, AZ | 1100 hrs<br>AIAA-2016-1658<br>**Data-Driven Certification of Additively Manufactured Parts**<br>D. Mies, W. Marsden, S. Dyer, S. Warde, Granta Design, Cambridge, United Kingdom | | |

| Thursday, 7 January 2016 | | | | | | |
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| **354-MDO-7** | **Mission Driven Design** | | | | | **Balboa A** |
| Chaired by: F. ENGELSEN, The Boeing Company and D. ALLISON, Optimal Flight Sciences LLC | | | | | | |
| 0900 hrs<br>AIAA-2016-1659<br>**An EGO-like Optimization Framework for Simultaneous Aircraft Design and Airline Allocation**<br>S. Roy, W. Crossley, Purdue University, West Lafayette, IN | 0930 hrs<br>AIAA-2016-1660<br>**Wing Aerostructural Optimization under Uncertain Payload Weight and Aircraft Range**<br>A. Elham, Delft University of Technology, Delft, The Netherlands ; L. Bahamonde Jacome, Technical University of Madrid, Madrid, Spain | 1000 hrs<br>AIAA-2016-1661<br>**An Aircraft Development Methodology Aligning Design and Strategy to Support Key Decision Making**<br>F. Burgaud, C. Frank, D. Mavris, Georgia Institute of Technology, Atlanta, GA | 1030 hrs<br>AIAA-2016-1662<br>**Allocation-mission-design optimization of next-generation aircraft using a parallel computational framework**<br>J. Hwang, J. Martins, University of Michigan, Ann Arbor, Ann Arbor, MI | 1100 hrs<br>AIAA-2016-1663<br>**Waverider Design, Analysis and Performance Evaluation**<br>F. Ferguson, N. Dasque, M. Dhanasar, North Carolina A&T State University, Greensboro, NC; I. Blankson, NASA Glenn Research Center, Cleveland, OH | | |

| Thursday, 7 January 2016 | | | | | | |
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| **355-MST-11** | **Model Design and Development** | | | | | **Golden Hill B** |
| Chaired by: K. KLOSINSKI, Engineering Systems, Inc. and P. KENNEY, NASA Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-1664<br>**Simulator Design for Flying and Handling Qualities Instruction**<br>J. Kemper, Calspan Corporation, Edwards, CA; M. Cotting, U.S. Air Force Test Pilot School, Edwards AFB, CA | 0930 hrs<br>AIAA-2016-1665<br>**A New Method of Flight Path Reconstruction Using the j2 Universal Tool-Kit**<br>J. Slane, K. Klosinski, R. Osteroos, Engineering Systems Inc., Colorado Springs, CO; D. Saracino, AvSafe, St. Louis, MO; J. Jeffery, j2 Aircraft Dynamics Ltd., Daresbury, United Kingdom | 1000 hrs<br>AIAA-2016-1666<br>**Aerodynamic Model Update Using Parameter Identification Supporting a Cessna Grand Caravan Engineering Simulation**<br>A. Paris, O. Alaverdi, AMERICAN SYSTEMS Corporation, Lexington Park, MD | 1030 hrs<br>AIAA-2016-1667<br>**Hard Real-Time General-Purpose Robotic Simulations of Autonomous Air Vehicles**<br>S. Walker, J. Shan, R. Allison, York University, Toronto, Canada | 1100 hrs<br>AIAA-2016-1668<br>**Design and Development of Ground-Based 5-DOF Spacecraft Formation Flying Testbed**<br>Y. Eun, C. Park, S. Park, Yonsei University, Seoul, South Korea | 1130 hrs<br>AIAA-2016-1669<br>**Design and Validation of a Gust Response Alleviation System Based on Generalized Predictive Control**<br>W. Zhuang, Z. Wu, C. Yang, C. Huang, Beihang University, Beijing, China | 1200 hrs<br>AIAA-2016-1670<br>**Usage of a Model Following Small Scale UAV for Evaluation of ACMI Ground System**<br>S. Jo, J. Kim, K. Choi, Inha University, Incheon, South Korea |

| Thursday, 7 January 2016 | | | | | | |
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| **356-MVC-1** | **Grid Generation** | | | | | **Nautical** |
| Chaired by: E. BLADES, ATA Engineering, Inc. and J. MASTERS, AEDC | | | | | | |
| 0900 hrs<br>AIAA-2016-1671<br>**Optimization-Based Smoothing for Extruded Meshes**<br>S. Karman, M. Remotigue, Pointwise, Inc., Fort Worth, TX | 0930 hrs<br>AIAA-2016-1672<br>**The impact of unstructured mesh generation approach on truncation error**<br>H. Fan, C. Ollivier Gooch, University of British Columbia, Vancouver, Canada | 1000 hrs<br>AIAA-2016-1673<br>**Automatic 2D high-order viscous mesh generation by Spring-Field and vector-adding**<br>T. Liu, L. Wang, University of Tennessee, Chattanooga, Chattanooga, TN; S. Karman, Pointwise, Inc., Fort Worth, TX; B. Hilbert, University of Tennessee, Chattanooga, Chattanooga, TN | 1030 hrs<br>AIAA-2016-1674<br>**Radial basis function mesh deformation including surface orthogonality**<br>T. Gillebaart, A. van Zuijlen, H. Bijl, Delft University of Technology, Delft, The Netherlands | 1100 hrs<br>AIAA-2016-1675<br>**Ventus: An Overset Adaptive Cartesian Simulation Framework for Moving Boundary Problems, Part II - Parallelism and Dynamic Load Balancing**<br>R. Harris, Self, Huntsville, AL | | |

| Thursday, 7 January 2016 | | | | | | |
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| **357-NDA-6** | **Reliability and Life Prediction** | | | | | **Old Town B** |
| Chaired by: T. KRISHNAMURTHY, NASA-Langley Research Center and E. TUEGEL, USAF | | | | | | |
| 0900 hrs<br>AIAA-2016-1676<br>**Sequential Subspace Reliability Method**<br>H. Bae, Wright State University, Dayton, OH; E. Alyanak, Air Force Research Laboratory, Wright-Patterson AFB, OH | 0930 hrs<br>AIAA-2016-1677<br>**Modeling epistemic uncertainty in the representation of spatial and temporal variability in reliability analysis**<br>H. Devathi, Z. Hu, S. Mahadevan, Vanderbilt University, Nashville, TN | 1000 hrs<br>AIAA-2016-1678<br>**Bearing Prognostics Method Based on Entropy Decrease at Specific Frequency**<br>D. An, N. Kim, University of Florida, Gainesville, Gainesville, FL; J. Choi, Korea Aerospace University, Goyang, South Korea | 1030 hrs<br>AIAA-2016-1679<br>**Aerospace electronics-and-photonics (AEP) reliability has to be quantified to be assured**<br>E. Suhir, ERS Company, Los Altos, CA | 1100 hrs<br>AIAA-2016-1680<br>**Probabilistic PoF based Framework for Fatigue Life Prediction of Aircraft Gas Turbine Discs**<br>S. Zhu, H. Huang, W. Peng, H. Wang, University of Electronic Science and Technology of China, Chengdu, China; S. Mahadevan, Vanderbilt University, Nashville, TN | | |

| Thursday, 7 January 2016 | | |
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| **358-NW-14**<br>**0900 - 0930 hrs** | **Thursday Late Morning Networking Coffee Break** | **Exposition Hall** |

| Thursday, 7 January 2016 | | | | | | |
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| **359-PC-14** | **Spray and Droplet Combustion II** | | | | | **Harbor B** |
| Chaired by: J. O`CONNOR, Pennsylvania State University and J. HAYNES, GE Global Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-1681<br>**Simulations of kerosene droplet combustion in vitiated air**<br>A. Giusti, J. Sidey, Cambridge University, Cambridge, United Kingdom; G. Borghesi, Sandia National Laboratories, Livermore, CA; E. Mastorakos, Cambridge University, Cambridge, United Kingdom | 0930 hrs<br>AIAA-2016-1682<br>**Droplet Combustion Characteristics of Butyl Butyrate, Limonene, and their Blends with Jet A-1**<br>D. Chaitanya Kumar Rao, S. Syam, S. Karmakar, Indian Institute of Technology Kharagpur, Kharagpur, India | 1000 hrs<br>AIAA-2016-1683<br>**Puffing and Micro-explosion behavior of Ethanol/Jet A-1 Fuel Droplets**<br>S. Syam, D. Chaitanya Kumar Rao, S. Karmakar, R. Joarder, Indian Institute of Technology Kharagpur, Kharagpur, India | 1030 hrs<br>AIAA-2016-1684<br>**Simulations of Injection of LOX/$GCH_4$ under Flashing Conditions**<br>T. Ramcke, M. Pfitzner, University of the German Federal Armed Forces, Neubiberg, Germany | 1100 hrs<br>AIAA-2016-1685<br>**Interface-Tracking Simulations of Droplet Vaporization and Burning of Hypergolic Propellants**<br>H. Tani, Y. Umemura, Y. Daimon, Japan Aerospace Exploration Agency (JAXA), Tsukuba, Japan; H. Terashima, Hokkaido University, Sapporo, Japan; M. Koshi, Yokohama National University, Yokohama, Japan | | |

| Thursday, 7 January 2016 | | | | | | |
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| **360-PC-15** | **Turbulent Combustion II - Fuel Chemistry** | | | | | **Harbor C** |
| Chaired by: C. LI, Air Force Office of Scientific Research and V. SANKARAN, US Air Force/AFRL | | | | | | |
| 0900 hrs<br>AIAA-2016-1687<br>**Impact of Chemical Kinetics Mechanisms on the Predictions of Bluff Body Stabilized Flames**<br>S. Sardeshmukh, W. Anderson, Purdue University, West Lafayette, IN | 0930 hrs<br>AIAA-2016-1688<br>**Investigation of chemical pathways for turbulent Hydrogen-Air premixed flames**<br>D. Dasgupta, W. Sun, Georgia Institute of Technology, Atlanta, GA; M. Day, Lawrence Berkeley National Laboratory, Berkeley, CA; T. Lieuwen, Georgia Institute of Technology, Atlanta, GA | 1000 hrs<br>AIAA-2016-1689<br>**Predicting and Accelerating Chemistry in High Speed Reacting Flows**<br>T. Wignall, C. Patton, T. Echekki, J. Edwards, North Carolina State University, Raleigh, NC | | | | |

| Thursday, 7 January 2016 | | | | | | |
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| **361-PDL-10** | **Novel Plasma Actuators, Concepts and Systems** | | | | | **Old Town A** |
| Chaired by: T. CORKE, University of Notre Dame | | | | | | |
| 0900 hrs<br>AIAA-2016-1690<br>**Development of plasma actuator based on surface sparks for a buffet control**<br>A. Firsov, Y. Isaenkov, M. Shurupov, Russian Academy of Sciences, Moscow, Russia ; S. Leonov, University of Notre Dame, Notre Dame, IN | 0930 hrs<br>AIAA-2016-1691<br>**Development of Serrated Multi-Electrode Plasma Actuators for Enhanced Force Production**<br>T. Matsuno, M. Sugahara, H. Kawazoe, Tottori University, Tottori, Japan; H. Nishida, Tokyo University of Agriculture and Technology, Koganei, Japan | 1000 hrs<br>AIAA-2016-1692<br>**Multi-point ignition of Hydrogen/ Air mixtures with single pulsed nanosecond surface dielectric barrier discharge. Morphology of the discharge in different gases at elevated pressures**<br>S. Shcherbanev, École Polytechnique, Palaiseau, France; N. Popov, Moscow State University, Moscow, Russia ; S. Starikovskaia, École Polytechnique, Palaiseau, France | 1030 hrs<br>AIAA-2016-1693<br>**Carbon Nanoparticles in the Radiation and Acoustic fields the Vicinity of the Arc Discharge**<br>M. Shneider, Princeton University, Princeton, NJ | 1100 hrs<br>AIAA-2016-1694<br>**Modeling of Microplasmas with Nano-Engineered Electrodes**<br>S. Tholeti, A. Alexeenko, S. Macheret, Purdue University, West Lafayette, IN | | |

| Thursday, 7 January 2016 | | | | | | |
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| **362-PDL-11** | **Plasma Diagnostics** | | | | | **Ocean Beach** |
| Chaired by: R. MILES, Princeton University | | | | | | |
| 0900 hrs<br>AIAA-2016-1695<br>***In-situ* quantitative measurement of ethylene from n-butane pyrolysis in a flow reactor**<br>L. Su, Z. Zhang, University of Tennessee, Knoxville, Knoxville, TN | 0930 hrs<br>AIAA-2016-1696<br>**Phase-Locked Averaged Schlieren of Periodic Nanosecond-Pulsed DBD Actuation in Quiescent Air**<br>H. Hu, H. Li, X. Meng, J. Wang, Northwestern Polytechnical University, Xi'an, China; F. Liu, S. Luo, University of California, Irvine, Irvine, CA | 1000 hrs<br>AIAA-2016-1697<br>**Optical Emission Spectroscopy of the A.C. Plasma Anemometer**<br>E. Matlis, C. Marshall, T. Corke, University of Notre Dame, Notre Dame, IN; S. Gogineni, Spectral Energies, LLC, Beavercreek, OH | 1030 hrs<br>AIAA-2016-1698<br>**Development of a Cavity Enhanced Thomson and Raman Scattering Diagnostic**<br>A. Friss, A. Yalin, Colorado State University, Fort Collins, CO | 1100 hrs<br>AIAA-2016-1699<br>**Plasma Density Measurements for Aero-Optic Applications Using Two-Wavelength Heterodyne Interferometry**<br>B. Neiswander, E. Matlis, T. Corke, University of Notre Dame, Notre Dame, IN | 1130 hrs<br>AIAA-2016-1700<br>**A Comparison of Radar REMPI and Laser Induced Fluorescence for Concentration Measurements**<br>T. Chng, R. Miles, Princeton University, Princeton, NJ | |

| Thursday, 7 January 2016 | | | | | | |
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| **363-SCS-5** | **Spacecraft Solar Array Structures I** | | | | | **Balboa B** |
| Chaired by: R. PAPPA, NASA Langley Research Center and M. CHAMBERLAIN, NASA | | | | | | |
| 0900 hrs<br>AIAA-2016-1701<br>**Structural Design Considerations for a 50 kW-Class Solar Array for NASA's Asteroid Redirect Mission**<br>T. Kerslake, T. Kraft, J. Yim, D. Le, NASA Glenn Research Center, Cleveland, OH | 0930 hrs<br>AIAA-2016-1702<br>**Rapid Parametric Analysis and Design of Space-Based Solar Arrays**<br>C. Rupp, L. Schweizer, ATA Engineering, Inc., San Diego, CA; D. Murphy, ATK, Goleta, CA | 1000 hrs<br>AIAA-2016-1703<br>**Simulation of the Deployment of a Flexible Roll-Up Solar Array Using Multi-Body Dynamics Software**<br>B. Ross, N. Woo, MotionPort, LLC, St. George, UT; J. Blandino, Virginia Military Institute, Lexington, VA | 1030 hrs<br>AIAA-2016-1704<br>**Composite Beam Roll-Out Array - A Multifunctional Deployable Structure for Space Power Generation**<br>T. Stern, K. Steele, Alliance Spacesystems, LLC, Los Alamitos, CA | 1100 hrs<br>AIAA-2016-1705<br>**Development of a Continuous Advanced Composite Truss Printing System**<br>Q. McAllister, J. Senne, A. Romanyszyn, San Diego Composites, San Diego, CA | 1130 hrs<br>AIAA-2016-1706<br>**Active Control of Solar Array Dynamics During Spacecraft Maneuvers**<br>B. Ross, N. Woo, MotionPort, LLC, St. George, UT; T. Kraft, NASA Glenn Research Center, Cleveland, OH; J. Blandino, Virginia Military Institute, Lexington, VA | |

| Thursday, 7 January 2016 | | | | | | |
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| **364-SD-10** | **Reduced Order Modeling II** | | | | | **Balboa C** |
| Chaired by: S. LIGUORE, Boeing Engineering Operations & Technology and S. RAGHAVAN, University of Central Florida | | | | | | |
| 0900 hrs<br>AIAA-2016-1707<br>**Using Complex Variables to Estimate the Derivatives of Nonlinear Reduced-Order Models**<br>J. Hollkamp, Air Force Research Laboratory, Wright-Patterson AFB, OH; P. O'Hara, Universal Technology Corporation, Wright-Patterson AFB, OH | 0930 hrs<br>AIAA-2016-1708<br>**Large Deformation Modeling of a Beam Type Structure and a 3D Wingbox using an Enhanced Modal Approach**<br>M. Ritter, German Aerospace Center (DLR), Göttingen, Germany; C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI | 1000 hrs<br>AIAA-2016-1709<br>**An Optimum Thermal Basis for Coupled Structural-Thermal Reduced Order Models**<br>R. Murthy, A. Matney, M. Mignolet, Arizona State University, Tempe, AZ | 1030 hrs<br>AIAA-2016-1710<br>**Modeling Fatigue Crack Propagation in a Ti-Alloy at Elevated Temperature within a Reduced-OrderModel Framework**<br>P. O'Hara, United Technologies Corporation, Dayton, OH; J. Hollkamp, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1100 hrs<br>AIAA-2016-1711<br>**Geometrically Non-linear Structural Dynamics using Increased-Order Modelling**<br>L. Bernhammer, Delft University of Technology, Delft, The Netherlands ; M. Karpel, Technion–Israel Institute of Technology, Haifa, Israel; M. Reyes, H. Climent Manez, Airbus, Getafe, Spain | | |

| Thursday, 7 January 2016 | | | | | | |
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| **365-SEN-3** | **Advanced Data Fusion Techniques** | | | | | **Regatta C** |
| Chaired by: T. FREY, Lockheed Martin Aeronautics | | | | | | |
| 0900 hrs<br>AIAA-2016-1712<br>**Cooperative-timing Attack with Smart Munitions using Cooperative Localization in Contested Environments**<br>R. Sharma, Utah State University, Logan, UT; S. Rathinam, Texas A&M University, College Station, TX | 0930 hrs<br>AIAA-2016-1713<br>**Novel Blind Load Balancing Scheduling Algorithms for Distributed Tracking Networks**<br>T. Frey, D. Faulk, Lockheed Martin Corporation, Fort Worth, TX | 1000 hrs<br>AIAA-2016-1714<br>**Database Completeness Impact on Target Identification Performance**<br>K. Engebretson, Lockheed Martin Corporation, Fort Worth, TX | | | | |

| Thursday, 7 January 2016 | | |
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| **366-SOF-7/UMS-8/IS-10**<br>**0900 - 1200 hrs** | **Assurance of Autonomy Symposium III** | **Coronado A** |

Managing Key Issues for Assured Autonomy

In this session, we examine several key challenges that directly impact our ability to generate assurance arguments for increasingly autonomous systems. Topics that will be addressed include human-machine interaction under increasingly autonomous systems, the management of uncertainty, and the management and mitigation of communications criticality.

We will begin with subject matter expert talks highlighting the effects of human-machine teaming on autonomous systems. We then proceed to a panel exploring the issues of uncertainty management and mitigating the effects of communications criticality. We then culminate with as set of lightning-fast (5-minute) talks for all assurance of autonomy themes. We strongly encourage these lightning-fast talks from our participants — please sign up in the Wednesday sessions.

Speaker:
**Steven Young**
NASA Langley Research Center

Panelists:
**Kerianne Gross**
Air Force Research Laboratory

**Johann Schumann**
NASA Ames Research Center/SGT

**Jim Murphy**
NASA Ames Research Center

**Natalia Alexandrov**
NASA Langley Research Center

**Mats Heimdahl**
University of Minnesota

Lightning-fast talks:
**Mike Lowry**
NASA Ames Research Center

**Kalmanje Krishnakumar**
NASA Ames Research Center

Audience Members

| Thursday, 7 January 2016 | | | | | | |
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| **367-STR-12** | **Spacecraft Structural Design** | | | | | **La Jolla A** |
| Chaired by: J. ZIPAY, NASA-Johnson Space Center | | | | | | |
| 0900 hrs<br>AIAA-2016-1715<br>**The Ultimate Factor of Safety for Aircraft and Spacecraft – Its History, Applications and Misconceptions**<br>J. Zipay, C. Modlin, NASA Johnson Space Center, Houston, TX; C. Larsen, NASA Engineering Safety Center, Hampton, VA | 0930 hrs<br>AIAA-2016-1716<br>**Thermo-structural design of the Hexafly-INT Experimental Flight Test Vehicle (EFTV) and Experimental Service Module (ESM)**<br>V. Carandente, R. Scigliano, Italian Aerospace Research Center (CIRA), Capua, Italy | 1000 hrs<br>AIAA-2016-1717<br>**Post-buckling Analysis of Curved Honeycomb Sandwhich Panels Containing Interfacial Disbonds**<br>E. Pineda, B. Bednarcyk, T. Krivanek, NASA Glenn Research Center, Cleveland, OH | 1030 hrs<br>AIAA-2016-1718<br>**Integrated Composite Stiffener Structure (ICoSS) Concept for Planetary Entry Vehicles**<br>S. Kellas, NASA Langley Research Center, Hampton, VA | 1100 hrs<br>AIAA-2016-1719<br>**Forward Skirt Structural Testing on the Space Launch System (SLS) Program**<br>J. Lohrer, R. Wright, Orbital ATK, Promontory, UT | 1130 hrs<br>AIAA-2016-1720<br>**Flutter Analysis of Laminated Curvilinear-Stiffened Plates**<br>R. Fernandes, A. Tamijani, Embry-Riddle Aeronautical University, Daytona Beach, FL | |

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| **368-STR-13** | **Buckling, Fatigue, and Fracture of Structures I** | | | | | **La Jolla B** |
| Chaired by: M. SCHULTZ, NASA Langley Research Center and C. BISAGNI | | | | | | |
| 0900 hrs<br>AIAA-2016-1721<br>**Peridynamic Truss Element for Viscoelastic Deformation**<br>M. Dorduncu, A. Barut, E. Madenci, University of Arizona, Tucson, AZ | 0930 hrs<br>AIAA-2016-1722<br>**Bond-Based Peridynamics with an Arbitrary Poisson's Ratio**<br>Y. Hu, E. Madenci, University of Arizona, Tucson, Tucson, AZ | 1000 hrs<br>AIAA-2016-1723<br>**Peridynamics for Predicting Tensile and Compressive Strength of Notched Composites**<br>Y. Hu, E. Madenci, University of Arizona, Tucson, Tucson, AZ; N. Phan, Naval Air Systems Command, Patuxent River, MD | 1030 hrs<br>AIAA-2016-1724<br>**Mean Stress Effects in Strain Energy-based Criterion for Fatigue Life Prediction**<br>S. Zhu, Q. Lei, H. Huang, Y. Yang, University of Electronic Science and Technology, Chengdu, China | 1100 hrs<br>AIAA-2016-1725<br>**Fiber Path Optimization of a Symmetric Laminate with a Cutout for Thermal Buckling, Using a Novel Finite Element Algorithm**<br>A. Vijayachandran, P. Acar, V. Sundararaghavan, University of Michigan, Ann Arbor, Ann Arbor, MI; A. Waas, University of Washington, Seattle, Seattle, WA | 1130 hrs<br>AIAA-2016-1726<br>**Influence of microstructure arrangement on the responses of composites beyond one representative unit cel.**<br>H. Huang, State University of New York, Stony Brook, NY | |

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| **369-TP-9** | **Non-Equilibrium Flows, Non-Equilibrium Radiation and Rarefied Flows II** | | | | | **Harbor G** |
| Chaired by: T. SCHWARTZENTRUBER, University of Minnesota and M. KIO, National Space Research & Development Agency | | | | | | |
| 0900 hrs<br>AIAA-2016-1727<br>**Title: Numeircal Simulations of Flows over a Small Sphere within Velocity Slip Regime**<br>C. Cai, New Mexico State University, Las Cruces, NM | 0930 hrs<br>AIAA-2016-1728<br>**Modeling of Non-equilibrium Radiation for $CO_2$-$N_2$ Gas Mixtures**<br>R. Macdonald, A. Munafò, University of Illinois, Urbana-Champaign, Urbana, IL; C. Johnston, NASA Langley Research Center, Hampton, VA; M. Panesi, University of Illinois, Urbana-Champaign, Urbana, IL | 1000 hrs<br>AIAA-2016-1729<br>**Investigation of Condensation Effect in $CO_2$ Hypersonic Rarefied Flows**<br>T. Ozawa, T. Suzuki, K. Fujita, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan | | | | |

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| **370-WE-8** | **Wind Energy: VAWT Aerodynamics** | | | | | **Harbor H** |
| Chaired by: D. MANIACI, Sandia National Laboratories | | | | | | |
| 0900 hrs<br>AIAA-2016-1730<br>**Parameterized Vertical-Axis Wind Turbine Wake Model Using CFD Vorticity Data**<br>E. Tingey, A. Ning, Brigham Young University, Provo, UT | 0930 hrs<br>AIAA-2016-1731<br>**Implicit Large-Eddy Simulation of 2D Counter-Rotating Vertical-Axis Wind Turbines**<br>S. Kanner, L. Wang, P. Persson, University of California, Berkeley, Berkeley, CA | 1000 hrs<br>AIAA-2016-1732<br>**An Experimental Investigation on the Near Wake Characteristics of a Darrious Vertical-Axis Wind Turbine**<br>M. Khosravi, P. Sarkar, H. Hu, Iowa State University, Ames, IA | 1030 hrs<br>AIAA-2016-1733<br>**Numerical / Experimental Investigation of Airfoil Shape for Small VAWT**<br>W. Yamazaki, Y. Arakawa, Nagaoka University of Technology, Nagaoka, Japan | 1100 hrs<br>AIAA-2016-1734<br>**Flow Curvature Effects for VAWT: a Review of Virtual Airfoil Transformations and Implementation in XFOIL**<br>S. van der Horst, J. van de Wiel, C. Simao Ferreira, Delft University of Technology, Delft, The Netherlands ; N. Ramos García, Technical University of Denmark, Lyngby, Denmark | 1130 hrs<br>AIAA-2016-1735<br>**Aerodynamic Optimization of Vertical Axis Wind Turbine with Trailing Edge Flap**<br>S. Ertem, C. Simao Ferreira, Delft University of Technology, Delft, The Netherlands ; M. Gaunaa, H. Madsen, Technical University of Denmark, Lyngby, Denmark | |

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| **371-WE-9** | **Wind Energy: Wind Turbine and Wind Plant Control** | | | | | **Harbor I** |
| Chaired by: S. FROST, NASA-Ames Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-1736<br>**Disturbance Accommodating Control based Independent Blade Pitch Control Design on CART2**<br>N. Wang, A. Wright, National Renewable Energy Laboratory, Golden, CO | 0930 hrs<br>AIAA-2016-1737<br>**Experimental Evaluation of Extremum Seeking Based Region-2 Controller for CART3 Wind Turbine**<br>Y. Xiao, Y. Li, M. Rotea, University of Texas, Dallas, Richardson, TX | 1000 hrs<br>AIAA-2016-1738<br>**impact of airfoil performance degradation on annual energy production and its mitigation via extremum seeking controls**<br>T. Ashuri, M. Rotea, C. Ponnurangam, Y. Xiao, University of Texas, Dallas, Richardson, TX | 1030 hrs<br>AIAA-2016-1739<br>**CFD Analysis on Load Mitigation of Wind Turbine Utilizing Individual Pitch Control in Stable ABL**<br>H. Oe, Tokyo University of Science, Katsushika, Japan; Y. Tanabe, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; H. Sugawara, Ryoyu Systems Company, Ltd., Shinagawa, Japan; M. Yamamoto, Tokyo University of Science, Katsushika, Japan | 1100 hrs<br>AIAA-2016-1740<br>**Aeroservoelastic analysis of storm-ride-through control strategies for wind turbines**<br>C. Tibaldi, M. Hansen, Technical University of Denmark, Roskilde, Denmark | 1130 hrs<br>AIAA-2016-1741<br>**Wake detection for wind farm control – Formulation and validation**<br>C. Bottasso, S. Cacciola, F. Campagnolo, J. Schreiber, Technical University of Munich, Munich, Germany | |

| Thursday, 7 January 2016 | | |
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| **372-PANEL-10**<br>**0930 - 1130 hrs** | **Thursday Morning Forum 360**<br><br>**Putting the E in STEM** | **Seaport F-G** |

Moderator: Meredith Drosback, Assistant Director for Education and Physical Sciences, Office of Science and Technology Policy, Executive Office of the President

Panelists:

**Thea Sahr**
Director of Programs
DiscoverE

**Edward J. Coyle**
John B Peatman Distinguished Professor of Electrical and Computer Engineering
Georgia Institute of Technology

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| 373-LUNCH-4<br>1230 - 1400 hrs | Recognition Luncheon: Celebrating Achievements in Aerospace Design/Structures and Literature | Seaport A-E |

**Michael Gazarik**
Technology Director
Ball Aerospace & Technologies Corporation

| Thursday, 7 January 2016 | | | | | | |
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| 374-ACD-11 | Micro Air Vehicle Design | | | | | Cortez Hill A |
| Chaired by: C. BIL, RMIT University and R. VOS | | | | | | |
| 1400 hrs<br>AIAA-2016-1742<br>**Development of an In-Flight-Deployable Micro-UAV**<br>T. Tao, R. Hansman, Massachusetts Institute of Technology, Cambridge, MA | 1430 hrs<br>AIAA-2016-1743<br>**Design and manufacture of a fixed wing MAV with zimmerman planform**<br>M. Hassanalian, A. Abdelkefi, New Mexico State University, Las Cruces, NM | 1500 hrs<br>AIAA-2016-1744<br>**Design and manufacture of a self-learning flapping wing-actuation system for a Dragonfly-inspired MAV**<br>J. Kok, University of South Australia, Mawson Lakes, Australia; J. Chahl, Australian National University, Edinburgh, Australia | 1530 hrs<br>AIAA-2016-1745<br>**Effective design of flapping wing actuation mechanisms: theory and experiments**<br>M. Hassanalian, A. Abdelkefi, New Mexico State University, Las Cruces, NM | 1600 hrs<br>AIAA-2016-1746<br>**Theoretical analysis and experimental verification for sizing of flapping wing micro air vehicles**<br>M. Hassanalian, A. Abdelkefi, M. Wei, New Mexico State University, Las Cruces, NM; S. Ziaei-Rad, Isfahan University of Technology, Isfahan, Iran | | |

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| 375-AFM-12 | Special Session: Realizing Performance Adaptive Aeroelastic Wing: Progress and Challenges | | | | | Coronado D |
| Chaired by: B. DANOWSKY, Systems Technology, Inc. and H. PFIFER, University of Minnesota | | | | | | |
| 1400 hrs<br>AIAA-2016-1747<br>**mAEWing1: Design, Build, Test - Invited**<br>C. Regan, B. Taylor, University of Minnesota, Minneapolis, MN | 1430 hrs<br>AIAA-2016-1748<br>**Flight-Dynamics and Flutter Modeling and Analyses of a Flexible Flying-Wing Drone - Invited**<br>D. Schmidt, University of Colorado, Colorado Springs, Colorado Springs, CO; W. Zhao, R. Kapania, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1500 hrs<br>AIAA-2016-1749<br>**Control Oriented Aeroservoelastic Modeling of a Small Flexible Aircraft using Computational Fluid Dynamics and Computational Structural Dynamics - Invited**<br>B. Danowsky, Systems Technology, Inc., Hawthorne, CA; T. Lieu, A. Coderre-Chabot, CMSoft, Inc., Palo Alto, CA | 1530 hrs<br>AIAA-2016-1750<br>**System Identification of a Small Flexible Aircraft - Invited**<br>H. Pfifer, University of Minnesota, Minneapolis, Minneapolis, MN; B. Danowsky, Systems Technology, Inc., Hawthorne, CA | 1600 hrs<br>AIAA-2016-1751<br>**Robust Control Design for Active Flutter Suppression**<br>J. Theis, H. Pfifer, P. Seiler, University of Minnesota, Minneapolis, Minneapolis, MN | 1630 hrs<br>AIAA-2016-1752<br>**Sensitivity of Robust Flutter Boundary to Model Uncertainties in Aeroservoelastic Systems - Invited**<br>A. Kotikalpudi, H. Pfifer, P. Seiler, University of Minnesota, Minneapolis, Minneapolis, MN | 1700 hrs<br>AIAA-2016-1753<br>**Ground Vibration Tests on a Flexible Flying Wing Aircraft - Invited**<br>A. Gupta, P. Seiler, University of Minnesota, Minneapolis, Minneapolis, MN; B. Danowsky, Systems Technology, Inc., Hawthorne, CA |

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| 376-AFM-13 | Flight Test and System Identification I | | | | | Harbor A |
| Chaired by: T. FIELDS, University of Missouri and C. SUCHOMEL, USAF | | | | | | |
| 1400 hrs<br>AIAA-2016-1754<br>**Low Cost Alternative to Motion Capture Systems for Indoor Flight Testing Using On-board Computer Vision**<br>A. Smith, E. Wang, J. LaCombe, University of Nevada, Reno, Reno, NV; T. Fields, University of Missouri, Kansas City, Kansas City, MO | 1430 hrs<br>AIAA-2016-1755<br>**Nonlinear Aircraft Attitude and Heading Reference System Failure Detection and Identification**<br>P. Lu, E. Van Kampen, C. de Visser, Q. Chu, Delft University of Technology, Delft, The Netherlands | 1500 hrs<br>AIAA-2016-1756<br>**Flight Test Overview for UAS Integration in the NAS Project**<br>J. Murphy, NASA Ames Research Center, Moffett Field, CA; P. Williams-Hayes, S. Kim, NASA Armstrong Flight Research Center, Edwards, CA; W. Bridges, Flight Research Associates, Moffett Field, CA; M. Marston, Jacobs, Edwards, CA | 1530 hrs<br>AIAA-2016-1757<br>**A Study on the Exhaust Heat Characteristics from a Wing Surface Depending on the Airfoil Shape at Low Reynolds Number**<br>K. Kamisori, K. Shimoyama, S. Obayashi, Tohoku University, Sendai, Japan | 1600 hrs<br>AIAA-2016-1758<br>**Design of Experiments with an Application to Laminar Flow Control Flight Research**<br>A. Tucker, Air Force Research Laboratory, Wright-Patterson AFB, OH; H. Reed, W. Saric, D. Ward, Texas A&M University, College Station, TX | 1630 hrs<br>AIAA-2016-1759<br>**Stability Augmentation for Rotor MAV Takeoff and Landing using a Meshed Platform**<br>M. Harada, S. Watanabe, R. Ichikawa, National Defense Academy, Yokosuka, Japan; K. Bollino, Naval Postgraduate School, Monterey, CA | 1700 hrs<br>AIAA-2016-1760<br>**Feasibility of In-Flight Quadrotor Individual Motor Thrust Measurements**<br>J. Bazin, T. Fields, University of Missouri, Kansas City, Kansas City, MO; A. Smith, Oregon State University, Corvallis, OR |

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| **377-AMT-8** | **High Speed Facility Measurements** | | | | | **Harbor D** |
| Chaired by: J. WAGNER, Sandia National Laboratories and C. JOHANSEN, University of Calgary | | | | | | |
| 1400 hrs<br>AIAA-2016-1761<br>**Simultaneous Measurements of Scalar and Velocity in a Mach 5 Turbulent Boundary Layer using Naphthalene PLIF and PIV**<br>C. Combs, N. Clemens, University of Texas, Austin, Austin, TX | 1430 hrs<br>AIAA-2016-1762<br>**Dual-Pump CARS Measurements in a Vibrationally Nonequilibrium Supersonic Mixing Layer**<br>M. Nishihara, K. Frederickson, W. Lempert, Ohio State University, Columbus, OH | 1500 hrs<br>AIAA-2016-1763<br>**OH PLIF Visualization of a Premixed Ethylene-fueled Dual-Mode Scramjet Combustor**<br>L. Cantu, E. Gallo, A. Cutler, George Washington University, Washington, D.C.; P. Danehy, NASA Langley Research Center, Hampton, VA; R. Rockwell, University of Virginia, Charlottesville, VA; C. Johansen, University of Calgary, Calgary, Canada; et al. | 1530 hrs<br>AIAA-2016-1764<br>**Optical Measurements of Shock Wave Oscillations in Transonic Diffusers by High-Speed Mach-Zehnder Interferometers**<br>T. Ota, S. Nakao, D. Ono, Y. Miyazato, University of Kitakyushu, Kitakyushu, Japan | 1600 hrs<br>AIAA-2016-1765<br>**Development of a Compact Focusing Color Schlieren Technique**<br>I. Schoegl, A. Pisano, G. Sedky, Louisiana State University, Baton Rouge, LA | 1630 hrs<br>AIAA-2016-1766<br>**Wavelet Analysis of Unsteady Shock-wave Motion on Two-dimensional Airfoil with Vortex Generators**<br>T. Kouchi, S. Yamaguchi, Okayama University, Okayama, Japan; S. Koike, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan; S. Yanase, Okayama University, Okayama, Japan; T. Nakajima, M. Sato, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan; et al. | 1700 hrs<br>AIAA-2016-1767<br>**Experimental Investigation of Unsteady Shock Oscillation by a Forward-Facing Hemisphere at Mach 3**<br>T. Mizukaki, Tokai University, Hiratsuka, Japan; K. Hatanaka, Tohoku University, Sendai, Japan; T. Saito, Muroran Institute of Technology, Muroran, Japan; K. Yamada, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan |

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| **378-APA-37** | **Special Session: Sea-Based Aviation Aeromechanics Computational Analysis** | | | | | **Coronado E** |
| Chaired by: N. HARIHARAN, CREATE-AV and D. FINDLAY | | | | | | |
| 1400 hrs<br>AIAA-2016-1768<br>**CFD Analysis of the F/A-18E Super Hornet during Aircraft-Carrier Landing High-Lift Aerodynamic Conditions**<br>B. Green, D. Findlay, Naval Air Systems Command, Patuxent River, MD | 1430 hrs<br>AIAA-2016-1769<br>**Shipboard Aircraft Simulation with Ship-Relative Navigation Sensor Modeling**<br>C. Wilkinson, D. Findlay, J. Nichols, Naval Air Systems Command, Patuxent River, MD; T. Keck, J.F. Taylor, Inc., Lexington Park, MD; D. Bayard, C. Liebe, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; et al. | 1500 hrs<br>AIAA-2016-1770<br>**Project MAGIC CARPET: "Advanced Controls and Displays for Precision Carrier Landings"**<br>J. Denham, Naval Air Systems Command, Patuxent River, MD | 1530 hrs<br>AIAA-2016-1771<br>**Development and Application of the SAFEDI Tool for Virtual Dynamic Interface Ship Airwake Analysis**<br>S. Polsky, C. Wilkinson, J. Nichols, D. Ayers, J. Mercado-Perez, Naval Air Systems Command, Patuxent River, MD; T. Davis, AMERICAN SYSTEMS Corporation, Lexington Park, MD | 1600 hrs<br>AIAA-2016-1772<br>**Methods for Characterizing Rotorcraft Pilot Strategy and Handling Qualities in the Shipboard Environment**<br>J. Pritchard, R. Wallace, D. Eksuzian, J. Tritschler, J. O'Connor, Naval Air Systems Command, Patuxent River, MD | 1630 hrs<br>AIAA-2016-1773<br>**Numerical Simulation of Water-Landing Performance of a Regional Aircraft**<br>Q. Qu, C. Liu, P. Liu, B. Guo, Beihang University, Beijing, China; R. Agarwal, Washington University in St. Louis, St. Louis, MO | |

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| **379-APA-38** | **Aerodynamic Testing: Wind-Tunnel II** | | | | | **Americas Cup B** |
| Chaired by: G. GATLIN, NASA Langley Research Center and D. CHAN, NASA-Langley Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-1774<br>**A New Type of Wind Tunnel for the Evaluation of Curved Motion**<br>J. Keogh, T. Barber, University of New South Wales, Sydney, Australia; S. Diasinos, Macquarie University, Sydney, Australia; G. Doig, California Polytechnic State University, San Luis Obispo, CA | 1430 hrs<br>AIAA-2016-1775<br>**Computational Analysis of the Transonic Dynamics Tunnel Using FUN3D**<br>P. Chwalowski, NASA Langley Research Center, Hampton, VA; E. Quon, Georgia Institute of Technology, Atlanta, GA | 1500 hrs<br>AIAA-2016-1776<br>**Investigation on the Flow-Field of Two Parallel Round Jets Impinging Normal to a Flat Surface**<br>L. Myers, N. Rudenko, D. McLaughlin, Pennsylvania State University, University Park, PA | 1530 hrs<br>AIAA-2016-1777<br>**Quantification of Drag from Flat Suspension Line for Parachutes and the Influence of Flow Induced Vibrations**<br>T. Siefers, J. Campbell, D. Clark, T. McLaughlin, U.S. Air Force Academy, Colorado Springs, CO; K. Bergeron, Army Research, Development and Engineering Command, Natick, MA | 1600 hrs<br>AIAA-2016-1778<br>**Qualitative Tuft Flow Visualization on the Volvo S60 under realistic driving Conditions**<br>D. Wieser, Technical University of Berlin, Berlin, Germany; S. Bonitz, Chalmers University of Technology, Göteborg, Sweden; C. Nayeri, C. Paschereit, Technical University of Berlin, Berlin, Germany; A. Broniewicz, L. Larsson, Volvo Car Corporation, Göteborg, Sweden; et al. | | |

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| **380-APA-39** | **Airfoil/Wing/Configuration Aerodynamics II** | | | | | **Americas Cup C** |
| Chaired by: E. WALKER, NASA Langley Research Center and M. POST, USAF Academy | | | | | | |
| 1400 hrs<br>AIAA-2016-1779<br>**Reduction of Induced Drag in Con guration Flight using Wing Twist at Post-Stall Angles of Attack**<br>M. Gunasekaran, R. Mukherjee, Indian Institute of Technology Madras, Chennai, India | 1430 hrs<br>AIAA-2016-1780<br>**Summary of First Aerodynamics Prediction Challenge (APC-I)**<br>A. Hashimoto, T. Aoyama, Y. Matsuo, M. Ueno, K. Nakakita, S. Hamamoto, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; et al. | 1500 hrs<br>AIAA-2016-1781<br>**Near-field Wingtip Vortex Characteristics of a Rectangular Wing in Ground Effect**<br>Q. Qu, L. Huang, P. Liu, Beihang University, Beijing, China; R. Agarwal, Washington University in St. Louis, St. Louis, MO | 1530 hrs<br>AIAA-2016-1782<br>**A Validation Study of OVERFLOW for Wing-Tip Vortices**<br>D. Schauerhamer, S. Robinson, University of California, Davis, Davis, CA | 1600 hrs<br>AIAA-2016-1783<br>**Aerodynamic shape optimization and static aeroelastic analysis of a morphing trailing edge wing**<br>M. Zhang, C. Yang, Z. Wan, Beihang University, Beijing, China | | |

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| **381-APA-40** | **Propeller/Rotorcraft/Wind Turbine Aerodynamics II** | | | | | **Americas Cup D** |
| Chaired by: J. RAULEDER, Technical University of Munich and A. VANDERWYST, Leidos | | | | | | |
| 1400 hrs<br>AIAA-2016-1784<br>**Adjoint-Based Optimisation of Ducted Propellers for Hybrid Air Vehicles**<br>M. Biava, M. Carrion, G. Barakos, University of Liverpool, Liverpool, United Kingdom; D. Stewart, Hybrid Air Vehicles, Bedford, United Kingdom | 1430 hrs<br>AIAA-2016-1785<br>**An Experimental Study on the Aerodynamics and Aeroacoustic Characteristics of Small Propellers**<br>Z. Ning, H. Hu, Iowa State University, Ames, IA | 1500 hrs<br>AIAA-2016-1786<br>**Aerodynamic Performance Characterization of Leading Edge Protrusions on Small Propellers**<br>K. Moore, A. Ning, Brigham Young University, Provo, UT | 1530 hrs<br>AIAA-2016-1787<br>**Computational and Experimental Investigations of Coaxial Rotor Unsteady Loads**<br>R. Singh, H. Kang, Army Research Laboratory, Aberdeen Proving Ground, MD; C. Cameron, J. Sirohi, University of Texas, Austin, Austin, TX | 1600 hrs<br>AIAA-2016-1788<br>**Multi-disciplinary Design of Small Rotor Blades in Multiple Rotor Configurations**<br>T. Carroll, I. George, G. Bramesfeld, Ryerson University, Toronto, Canada | | |

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| **382-ASC-6** | **Health Monitoring** | | | | | **Gaslamp D** |
| Chaired by: R. JHA, Mississippi State University and S. JOSHI, NextGen Aeronautics Inc | | | | | | |
| 1400 hrs<br>AIAA-2016-1789<br>**The Spacecraft SHM Experiment, Part 2: Integration, Challenges and Early Ground Science**<br>D. Doyle, S. Lee, J. Stein, B. Cooper, M. Campisi, Air Force Research Laboratory, Kirtland AFB, NM; S. Kessler, Metis Design Corporation, Boston, MA | 1430 hrs<br>AIAA-2016-1790<br>**Characterization of Aircraft Structural Damage using Guided Wave Based Finite Element Analysis for in-Flight Structural Health Management**<br>T. Krishnamurthy, NASA Langley Research Center, Hampton, VA; B. Seshadri, National Institute of Aerospace, Hampton, VA; R. Ross, NASA Langley Research Center, Hampton, VA | 1500 hrs<br>AIAA-2016-1791<br>**Wavelet Spectral Finite Element Modeling for Health Monitoring of Adhesively Bonded Joints**<br>N. Jayakody, R. Jha, Mississippi State University, Starkville, MS; D. Samaratunga, The Aerospace Corporation, El Segundo, CA | 1530 hrs<br>AIAA-2016-1792<br>**In-situ Structural Health Monitoring of Carbon Fiber Reinforced Composites with CNT Smart Paint**<br>Y. Atescan, H. Cebeci, Istanbul Technical University, Istanbul, Turkey | 1600 hrs<br>AIAA-2016-1793<br>**Harvesting Energy from Internal Flows with Piezocomposite Transducers: Towards a Self-Powered Low-Cost Blood Pressure Measurement Device**<br>O. Bilgen, Old Dominion University, Norfolk, VA; J. Kenerson, Cardiovascular Associates, Virginia Beach, VA; M. Akpinar-Elci, R. Hattery, Old Dominion University, Norfolk, VA | | |

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| **383-DSC-5** | **Nonlinear Aeroelasticity** | | | | | | **Gaslamp C** |
| Chaired by: R. PALACIOS, Imperial College London and I. CHOPRA, University of Maryland | | | | | | | |
| 1400 hrs<br>AIAA-2016-1794<br>**Enhanced Modal Approach for Free-flight Nonlinear Aeroelastic Simulation of Very Flexible Aircraft**<br>M. Ritter, German Aerospace Center (DLR), Göttingen, Germany; J. Jones, C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI | 1430 hrs<br>AIAA-2016-1795<br>**A Reduced Order Model-Based Nonlinear Damping Model: Formulation and Application to Post Flutter Aeroelastic Behavior**<br>P. Song, X. Wang, M. Mignolet, Arizona State University, Tempe, AZ; P. Chen, ZONA Technology, Inc., Scottsdale, AZ | 1500 hrs<br>AIAA-2016-1796<br>**Nonlinear Aerodynamics and Nonlinear Structures Interaction for F-16 Limit Cycle Oscillation Prediction**<br>Z. Zhang, P. Chen, ZONA Technology, Inc., Scottsdale, AZ; X. Wang, M. Mignolet, Arizona State University, Phoenix, AZ | 1530 hrs<br>AIAA-2016-1797<br>**Geometrically Non-linear Structural Modal Model for Aeroelastic Applications**<br>E. Kantor, R. Cavallaro, D. Raveh, Technion–Israel Institute of Technology, Haifa, Israel | 1600 hrs<br>AIAA-2016-1798<br>**Aeroelastic Modelling of Highly Flexible Wings**<br>C. Howcroft, D. Calderon, L. Lambert, M. Castellani, J. Cooper, M. Lowenberg, University of Bristol, Bristol, United Kingdom; et al. | 1630 hrs<br>AIAA-2016-1799<br>**Nonlinear Aeroelastic Analysis of the X-56 Multi-Utility Aeroelastic Demonstrator**<br>J. Jones, C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI | 1700 hrs<br>AIAA-2016-1800<br>**Numerical and Experimental Investigations on Very Flexible Aero-structures**<br>O. Stalnov, Technical University of Berlin, Berlin, Germany; A. Da Ronch, University of Southampton, Southampton, United Kingdom |

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| **384-EDU-2** | **Advancing Aerospace Education II** | | | | | **Bankers Hill** |
| Chaired by: R. LEBEAU, Saint Louis University | | | | | | |
| 1400 hrs<br>AIAA-2016-1801<br>**Senior Capstone Design Project for Preparing Undergraduate Students for Work in a Research and Engineering Environment**<br>V. Naoumov, N. Al Masoud, H. Nguyen, E. Patallo, A. Mocarski, Central Connecticut State University, New Britain, CT | 1430 hrs<br>AIAA-2016-1802<br>**From Teamwork to United Courses: Summary of a Decade's Reforms on Undergraduate Aircraft Design Education**<br>H. Liu, C. Wen, K. Sun, M. Luo, Y. Zhou, Beihang University, Beijing, China | 1500 hrs<br>AIAA-2016-1803<br>**Incorporation of Museum-Based Service Learning into an Aerospace Engineering Course**<br>M. Martin, P. Davis, D. Bowles, M. Lima, Louisiana State University, Baton Rouge, LA | 1530 hrs<br>AIAA-2016-1804<br>**Top Down Design Applied to the Aerospace Engineering Senior Capstone Program**<br>T. Gielda, A. Lee, B. Kirkpatrick, Iowa State University, Ames, IA | 1600 hrs<br>AIAA-2016-1805<br>**Aeronautical and Astronautical Engineering Major Selection in First-Year Engineering Students**<br>K. Kecskemety, R. Kajfez, Ohio State University, Columbus, OH | | |

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| **385-FD-47** | **CFD: Multiphase and Multi-Species Flows** | | | | | **Pier** |
| Chaired by: M. LIOU, NASA Glenn Research Center | | | | | | |
| 1400 hrs<br>AIAA-2016-1806<br>**Development of a VOF-Based Interface Capturing Method Using a Family of Bounded Compressive Flux Blending Schemes in an Existing Finite Volume Flow Solver**<br>R. Smith, Naval Surface Warfare Center, Panama City, FL | 1430 hrs<br>AIAA-2016-1807<br>**Improved Weighted Compact Nonlinear Scheme for Flows with Shocks and Material Interfaces: Algorithm and Assessment**<br>M. Wong, S. Lele, Stanford University, Stanford, CA | 1500 hrs<br>AIAA-2016-1808<br>**A High-Order Finite-Volume Method for Combustion**<br>X. Gao, L. Owen, S. Guzik, Colorado State University, Fort Collins, CO | 1530 hrs<br>AIAA-2016-1809<br>**Numerical simulation of laser energy deposition near a wall**<br>S. Ghosh, Indian Institute of Technology Madras, Chennai, India | | | |



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| **386-FD-48** | **Exploiting Hardware and Software Advances in CFD** | | | | | **Cove** |
| Chaired by: Q. WANG, MIT | | | | | | |
| 1400 hrs<br>AIAA-2016-1810<br>**Data Assimilated Computational Fluid Dynamics Algorithm for Combustion**<br>X. Gao, Y. Wang, N. Overton, I. May, Colorado State University, Fort Collins, CO; X. Tu, University of Kansas, Lawrence, Lawrence, KS | 1430 hrs<br>AIAA-2016-1811<br>**Extending a Three-Dimensional GPU RANS Solver for Unsteady Grid Motion and Free-Wake Coupling**<br>D. Jude, J. Baeder, University of Maryland, College Park, College Park, MD | 1500 hrs<br>AIAA-2016-1812<br>**Enabling Performance Optimization of CFD Applications with Source-to-Source Compiler Technology**<br>J. Riley, X. Gao, S. Guzik, Colorado State University, Fort Collins, CO | 1530 hrs<br>AIAA-2016-1813<br>**Towards Portability For A Compressible Finite-Volume CFD Code**<br>D. Curran, C. Allen, S. McIntosh-Smith, University of Bristol, Bristol, United Kingdom; D. Beckingsale, University of Warwick, Coventry, United Kingdom | 1600 hrs<br>AIAA-2016-1814<br>**On the Use of Discrete Nonlinear Reduced-Order Models for the Prediction of Steady-State Flows Past Parametrically Deformed Complex Geometries**<br>K. Washabaugh, C. Farhat, C. Othmer, Stanford University, Stanford, CA | 1630 hrs<br>AIAA-2016-1815<br>**OpenACC directive-based GPU acceleration of an implicit reconstructed discontinuous Galerkin method for compressible flows on 3D unstructured grids**<br>J. Lou, North Carolina State University, Raleigh, NC; Y. Xia, Idaho National Laboratory, Idaho Falls, ID; L. Luo, H. Luo, J. Edwards, F. Mueller, North Carolina State University, Raleigh, NC | 1700 hrs<br>AIAA-2016-1816<br>**Further Development of the Navier-Stokes Equations-Based Mean Flow Perturbation Technique**<br>M. Waindim, S. Bhaumik, D. Gaitonde, Ohio State University, Columbus, OH |

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| **387-FD-49** | **Flow-Control Actuators** | | | | | **Cortez Hill C** |
| Chaired by: L. PACK MELTON, NASA-Langley Research Center and J. BONS, Ohio State University | | | | | | |
| 1400 hrs<br>AIAA-2016-1817<br>**Active Flow Control Using Sweeping Jet Actuators on a Semi-Span Wing Model**<br>L. Pack Melton, M. Koklu, NASA Langley Research Center, Hampton, VA | 1430 hrs<br>AIAA-2016-1818<br>**Unsteady Flow Simulation of a Sweeping Jet Actuator Using a Lattice-Boltzmann Method**<br>B. Duda, E. Fares, M. Wessels, Exa Corporation, Stuttgart, Germany; V. Vatsa, NASA Langley Research Center, Hampton, VA | 1500 hrs<br>AIAA-2016-1819<br>**Flow response to multi-spark and multi-jet flow actuation**<br>N. Yurchenko, P. Vynogradskyy, K. Kuzmenko, National Academy of Sciences, Kiev, Ukraine | 1530 hrs<br>AIAA-2016-1820<br>**Aerodynamic Load Control through Blowing**<br>N. Al-Battal, D. Cleaver, I. Gursul, University of Bath, Bath, United Kingdom | 1600 hrs<br>AIAA-2016-1821<br>**Control of fluid flows using multivariate spline reduced order models**<br>H. Tol, C. de Visser, M. Kotsonis, Delft University of Technology, Delft, The Netherlands | 1630 hrs<br>AIAA-2016-1822<br>**Control of Leading-Edge Airfoil Stall Using Pulsed Jets**<br>K. Hipp, M. Walker, S. Benton, J. Bons, Ohio State University, Columbus, OH | 1700 hrs<br>AIAA-2016-1823<br>**Physics and Control of the Flow over Generic Diamond Shaped Wing**<br>S. Endrikat, B. Roentsch, J. Little, L. Taubert, I. Wygnanski, University of Arizona, Tucson, Tucson, AZ |

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| **388-FD-50** | **Flux Reconstruction/Correction Procedure via Reconstruction (FR/CPR)** | | | | | **Harbor F** |
| Chaired by: H. HUYNH, NASA Glenn Research Center and D. BODONY, University of Illinois at Urbana-Champaign | | | | | | |
| 1400 hrs<br>AIAA-2016-1824<br>**Equivalence between the Energy Stable Flux Reconstruction and Filtered Discontinuous Galerkin Schemes: Numerical Validation**<br>P. Zwanenburg, S. Nadarajah, McGill University, Montréal, Canada | 1430 hrs<br>AIAA-2016-1825<br>**Extension of the Flux Reconstruction Method to Triangular Elements using Collapsed-Edge Quadrilaterals**<br>J. Romero, A. Jameson, Stanford University, Stanford, CA | 1500 hrs<br>AIAA-2016-1826<br>**Adaptive RANS Solution with the High-order Correction Procedure via Reconstruction Method**<br>L. Shi, C. Zhou, Z. Wang, University of Kansas, Lawrence, Lawrence, KS | 1530 hrs<br>AIAA-2016-1827<br>**A high-order flux reconstruction solver for unsteady incompressible Navier-Stokes equations on unstructured grids with implicit time stepping**<br>C. Cox, C. Liang, M. Plesniak, George Washington University, Washington, D.C. | 1600 hrs<br>AIAA-2016-1828<br>**A High-Order Dual-Time Stepping FR/CPR Method for Unsteady Incompressible Navier-Stokes Equations on Unstructured Moving Grids**<br>L. Wang, M. Yu, University of Maryland, Baltimore County, Baltimore, MD | 1630 hrs<br>AIAA-2016-1829<br>**Adjoint-based Mesh Adaptation for the 3D Navier-Stokes Equations with the High-order CPR Method**<br>L. Shi, Z. Wang, University of Kansas, Lawrence, Lawrence, KS | |

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| **389-FD-51** | **RANS/LES of Separated Flows** | | | | | **Harbor E** |
| Chaired by: D. RIZZETTA | | | | | | |
| 1400 hrs<br>AIAA-2016-1830<br>**Simulation of Wing and Nacelle Stall**<br>R. Radespiel, D. Francois, D. Hoppmann, S. Klein, P. Scholz, Technical University of Braunschweig, Braunschweig, Germany; K. Wawrzinek, University of Stuttgart, Stuttgart, Germany; et al. | 1430 hrs<br>AIAA-2016-1831<br>**Numerical investigation of flow separation from aircraft tail surfaces.**<br>A. Masi, J. Cui, P. Tucker, University of Cambridge, Cambridge, United Kingdom | 1500 hrs<br>AIAA-2016-1832<br>**Detached-Eddy Simulation of flow past a pitching NACA 0015 airfoil with pulsed actuation**<br>L. Wang, L. Li, S. Fu, Tsinghua University, Beijing, China | 1530 hrs<br>AIAA-2016-1833<br>**Low- and Medium-Frequency Unsteadinesses in a Transitional Shock--Boundary Reflection with Separation**<br>L. Larchevêque, Aix-Marseille University, Marseille, France | 1600 hrs<br>AIAA-2016-1834<br>**A Novel Zonal RANS-DES Method for Prediction of Accelerated and Separated Flow**<br>H. Kalsi, P. Tucker, University of Cambridge, Cambridge, United Kingdom | 1630 hrs<br>AIAA-2016-1835<br>**Realizable Dynamic Large Eddy Simulation of Separated Flows**<br>R. Mokhtarpoor, S. Heinz, M. Stoellinger, University of Wyoming, Laramie, Laramie, WY; P. Balakumar, NASA Langley Research Center, Hampton, VA | 1700 hrs<br>AIAA-2016-1836<br>**Application of a Lattice-Boltzmann Method to the Separated Flow over the NASA Hump**<br>B. Duda, E. Fares, Exa GmbH, Stuttgart, Germany |

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| **390-FD-52** | **Reacting Flows** | | | | | **Promenade B** |
| Chaired by: E. HASSAN, Air Force Research Laboratory and M. IHME, Stanford University | | | | | | |
| 1400 hrs<br>AIAA-2016-1838<br>**Compressible Flamelet Model in a Rule-Based Turbulent Combustion Solver**<br>S. Thakur, J. Wright, Streamline Numerics, Inc., Gainesville, FL; M. Ihme, Stanford University, Stanford, CA | 1430 hrs<br>AIAA-2016-1839<br>**Global Analysis of Premixed Combustion with Swirl and Vortex Breakdown**<br>Z. Rusak, J. Choi, N. Bourquard, Rensselaer Polytechnic Institute, Troy, NY; S. Wang, University of Auckland, Auckland, New Zealand | 1500 hrs<br>AIAA-2016-1840<br>**Identification of unstable coherent modes in reacting swirling flows and their control**<br>C. Paschereit, Technical University of Berlin, Berlin, Germany | 1530 hrs<br>AIAA-2016-1841<br>**High-Speed Flow Field Measurements of Turbulent Jet Flames Undergoing Shear Layer Manipulation**<br>H. Nawroth, C. Paschereit, Technical University of Berlin, Berlin, Germany | 1600 hrs<br>AIAA-2016-1842<br>**The Effect of Soot nano-Particles Injection on Two-Phase Smoke Aerosol Formation in a Kerosene-Fired Burner**<br>M. Darbandi, M. Ghafourizadeh, Sharif University of Technology, Tehran, Iran ; G. Schneider, University of Waterloo, Waterloo, Canada | 1630 hrs<br>AIAA-2016-1843<br>**The Effects of Baffle Plate on Soot Nano-Aerosol and Pollutant Productions in a JP-Fueled Combustor**<br>M. Darbandi, M. Ghafourizadeh, Sharif University of Technology, Tehran, Iran ; G. Schneider, University of Waterloo, Waterloo, Canada | |

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| **391-FD-53** | **Vortex Flows II: Experimental Investigations** | | | | | **Promenade A** |
| Chaired by: I. GURSUL, University of Bath | | | | | | |
| 1400 hrs<br>AIAA-2016-1844<br>**Transient, Three-Dimensional Disturbances Interacting with a High-Lift Airfoil - Wind Tunnel Experiments**<br>S. Klein, P. Scholz, R. Radespiel, Technical University of Braunschweig, Braunschweig, Germany | 1430 hrs<br>AIAA-2016-1845<br>**A Statistical Approach to the Identification of Vortical Structures During Dynamic Stall with Flow Control**<br>K. Taylor, M. Amitay, Rensselaer Polytechnic Institute, Troy, NY | 1500 hrs<br>AIAA-2016-1846<br>**Experimental study of tip vortex flow from a periodically pitched airfoil section**<br>K. Zaman, A. Fagan, M. Mankbadi, NASA Glenn Research Center, Cleveland, OH | 1530 hrs<br>AIAA-2016-1847<br>**Wingtip Vortex Behavior in the Vicinity of the Maximum Lift to Drag Ratio Lift Condition**<br>M. Memon, A. Altman, University of Dayton, Dayton, OH | 1600 hrs<br>AIAA-2016-1848<br>**Interaction of Trailing Vortices with Downstream Wings**<br>C. Chen, Z. Wang, D. Cleaver, I. Gursul, University of Bath, Bath, United Kingdom | | |

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| **392-GNC-32** | **Invited Session: Interval Management: Avionics Algorithms and Performance Analysis** | | | | | **Coronado B** |
| Chaired by: I. LEVITT, Federal Aviation Administration and L. WEITZ, The MITRE Corporation | | | | | | |
| 1400 hrs<br>AIAA-2016-1849<br>**Modeling Uncertainty in Inter-aircraft Spacing Between the Final Approach Fix and the Runway Threshold**<br>H. Stassen, L. Weitz, S. Priess, MITRE Corporation, McLean, VA | 1430 hrs<br>AIAA-2016-1850<br>**Defining an Error Budget for Required Interval Management Performance**<br>L. Weitz, MITRE Corporation, McLean, VA; I. Levitt, Federal Aviation Administration, Atlantic City, NJ; J. Martensson, EUROCONTROL, Brussels, Belgium | 1500 hrs<br>AIAA-2016-1851<br>**Development of an Interval Management Algorithm for Delayed Traffic**<br>B. Barmore, K. Swieringa, M. Underwood, NASA Langley Research Center, Hampton, VA; T. Abbott, Stinger Ghaffarian Technologies, Inc., Hampton, VA; R. Leonard, Virginia Commonwealth University, Richmond, VA | 1530 hrs<br>AIAA-2016-1852<br>**Evaluating the Impact of Estimated Time of Arrival Accuracy on Interval Management Performance**<br>X. Bai, Rutgers University, Piscataway, NJ; L. Weitz, S. Priess, MITRE Corporation, McLean, VA | 1600 hrs<br>AIAA-2016-1853<br>**Designing Stochastic Optimal Control Laws for Interval Management**<br>T. Gaydos, L. Weitz, MITRE Corporation, McLean, VA | 1630 hrs<br>AIAA-2016-1854<br>**Closing The Loop: Testing for IM Avionics Certification**<br>S. Bowman, D. Elliott, MITRE Corporation, McLean, VA; B. Perez, Regulus Group, Galloway, NJ; D. Walker, Federal Aviation Administration, Washington, D.C. | |

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| **393-GNC-33** | **Novel Navigation, Estimation and Tracking II** | | | | | **Hillcrest A** |
| Chaired by: M. INNOCENTI, University of Pisa and W. FICHTER, University of Stuttgart | | | | | | |
| 1400 hrs<br>AIAA-2016-1855<br>**Adaptive Estimation of Nonlinear Spacecraft Attitude Dynamics with Time-Varying Moments of Inertia Using On-Board Sensors**<br>J. Hess, E. Swenson, Air Force Institute of Technology, Wright-Patterson AFB, OH; F. Leve, Air Force Research Laboratory, Kirtland AFB, NM; J. Black, Virginia Polytechnic Institute and State University, Blacksburg, VA; G. Goff, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1430 hrs<br>AIAA-2016-1856<br>**Norm-constrained Unscented Kalman Filter with Application to High Area-to-Mass Ratio Space-Debris Tracking**<br>S. Chee, McGill University, Montréal, Canada; J. Forbes, University of Michigan, Ann Arbor, Ann Arbor, MI | 1500 hrs<br>AIAA-2016-1857<br>**Application of Active-Passive Dynamic Consensus Filter Approach to Multitarget Tracking Problem for Situational Awareness in Unknown Environments**<br>J. Peterson, T. Yucelen, Missouri University of Science and Technology, Rolla, MO | 1530 hrs<br>AIAA-2016-1858<br>**Smooth Singularity Free Solution to the Three-Dimensional Bearings-Only Tracking Problem**<br>L. Schmitt, W. Fichter, University of Stuttgart, Stuttgart, Germany | 1600 hrs<br>AIAA-2016-1859<br>**A Dynamic Sensor Tasking Strategy for Tracking Maneuvering Spacecraft using Multiple Models**<br>G. Goff, Air Force Institute of Technology, Wright-Patterson AFB, OH; J. Black, Virginia Polytechnic Institute and State University, Blacksburg, VA; J. Beck, Air Force Research Laboratory, Wright-Patterson AFB, OH; J. Hess, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1630 hrs<br>AIAA-2016-1860<br>**State-Dependent Adaptive Estimation for Impulsively Maneuvering Spacecraft Tracking**<br>S. Lee, I. Hwang, Purdue University, West Lafayette, IN | 1700 hrs<br>AIAA-2016-1861<br>**Predictive Modeling of Pedestrian Motion Patterns with Bayesian Nonparametrics**<br>Y. Chen, M. Liu, S. Liu, J. Miller, J. How, Massachusetts Institute of Technology, Cambridge, MA |

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| **394-GNC-34/ACD-12** | **Aircraft GNC II** | | | | | **Hillcrest C** |
| Chaired by: J. HENRICKSON, Texas A&M University and M. OPPENHEIMER, AFRL/RBCA | | | | | | |
| 1400 hrs<br>AIAA-2016-1862<br>**Cooperative Control for Missile Evasion**<br>R. Carr, J. Torf, R. Cobb, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1430 hrs<br>AIAA-2016-1863<br>**Virtual Model Control of Rotorcraft with Articulated Landing Gear for Shipboard Landing**<br>D. Kim, M. Costello, Georgia Institute of Technology, Atlanta, GA | 1500 hrs<br>AIAA-2016-1864<br>**Shape Control of Tensegrity Airfoils**<br>J. Henrickson, Texas A&M University, College Station, TX; R. Skelton, University of California, San Diego, La Jolla, CA; J. Valasek, Texas A&M University, College Station, TX | 1530 hrs<br>AIAA-2016-1865<br>**Enforcing State Constraints on a Model of a Hypersonic Vehicle**<br>D. Famularo, J. Valasek, Texas A&M University, College Station, TX; J. Muse, M. Bolender, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1600 hrs<br>AIAA-2016-1866<br>**Differential Game-Based Control Law for Stabilization of Aeroelastic System with Gust Load**<br>P. Ghorawat, University of Nevada, Las Vegas, Las Vegas, NV; K. Lee, Catholic Kwandong University, Gangwon, South Korea ; S. Singh, University of Nevada, Las Vegas, Las Vegas, NV | 1630 hrs<br>AIAA-2016-1867<br>**Integrated Control and Display Augmentation for Manual Remote Flight Control in the Presence of Large Latency**<br>F. Zhang, T. Fricke, F. Holzapfel, Technical University of Munich, Munich, Germany | |

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| **395-GNC-35** | **Trajectory Design** | | | | | **Cortez Hill B** |
| Chaired by: D. DOMAN, Air Force Research Laboratory and W. WHITACRE, Draper Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-1868<br>**Trajectory Specification for Automation of Terminal Air Traffic Control**<br>R. Paielli, NASA Ames Research Center, Moffett Field, CA | 1430 hrs<br>AIAA-2016-1869<br>**Performance Characterization of Tightly-Coupled GNSS Precise Point Positioning Inertial Navigation within a Simulation Environment**<br>R. Watson, V. Sivaneri, J. Gross, West Virginia University, Morgantown, WV | 1500 hrs<br>AIAA-2016-1870<br>**Efficient Approximation of Optimal High-Order Kinematic Trajectories**<br>J. Mooney, E. Johnson, Georgia Institute of Technology, Atlanta, GA | 1530 hrs<br>AIAA-2016-1871<br>**Augmenting Wireless Time-of-Arrival Positioning with Terrain Elevation Measurements for Navigation in absence of GPS**<br>B. Copp, K. Subbarao, University of Texas, Arlington, Arlington, TX | 1600 hrs<br>AIAA-2016-1872<br>**An Optimization Paradigm for Arrival Trajectories usingTrajectory Segmentation and State Parameterization**<br>H. Yu, E. Van Kampen, J. Mulder, Delft University of Technology, Delft, The Netherlands | 1630 hrs<br>AIAA-2016-1873<br>**G3-Continuous Trajectory Design For Fixed-Wing Aircraft Based On 6-DoF Kinematics**<br>M. Gros, W. Fichter, University of Stuttgart, Stuttgart, Germany | 1700 hrs<br>AIAA-2016-1874<br>**Fast Generation of Landing Paths for Fixed-Wing Aircraft with Thrust Failure**<br>J. Stephan, W. Fichter, University of Stuttgart, Stuttgart, Germany |

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| **396-GNC-36** | **Missile Autopilots and Integrated Guidance & Control** | | | | | **Hillcrest B** |
| Chaired by: S. FLEISCHMAN, French-German Institute of Saint-Louis (ISL) and G. STRUB, University of Haute-Alsace | | | | | | |
| 1400 hrs<br>AIAA-2016-1875<br>**Skid-To-Turn Autopilot Design and Validation for an Experimental Guided Projectile Prototype**<br>G. Strub, French-German Research Institute of Saint-Louis (ISL), Saint-Louis, France; M. Basset, University of Upper Alsace, Mulhouse, France | 1430 hrs<br>AIAA-2016-1876<br>**Extended Kalman Filter Based Robust Altitude Controller for Sea Skimming Missiles**<br>O. Dulgar, R. Gezer, ROKETSAN Missile Industries, Inc., Ankara, Turkey; A. Kutay, Middle East Technical University, Ankara, Turkey | 1500 hrs<br>AIAA-2016-1877<br>**Integrated guidance and control of agile missiles using the Finite-SDRE approach**<br>J. Yang, Z. Wang, Nanjing University of Science and Technology, Nanjing, China | 1530 hrs<br>AIAA-2016-1878<br>**Acceleration-free Nonlinear Guidance and Tracking Control of Hypersonic Missiles for Maximum Target Penetration**<br>S. Mehta, C. Ton, University of Florida, Shalimar, Shalimar, FL; W. Mackunis, Embry-Riddle Aeronautical University, Daytona Beach, FL | | | |

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| **397-GT-8** | **Model Attitude, Deformation, and Data Acquisition Techniques (Invited)** | | | | | **Hillcrest D** |
| Chaired by: R. GUYTON, USAF Wright Lab and B. WILLIAMS, The Aerospace Corporation | | | | | | |
| 1400 hrs<br>AIAA-2016-1879<br>**Development of an Active Damping System for use with a Single Strut Mount**<br>J. Pereira, National Research Council Canada, Ottawa, Canada | 1430 hrs<br>Oral Presentation<br>**On-board Remote Model Attitude Sensor for the ARFL Vertical Wind Tunnel**<br>P. Smith, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1500 hrs<br>Oral Presentation<br>**Projection Moiré Interferometry Measurement System for Rotorcraft Applications**<br>M. Sekula, NASA Langley Research Center, Hampton, VA | 1530 hrs<br>Oral Presentation<br>**Model Deformation Methods at ETW - Recent Applications and Ongoing Developments**<br>H. Quix, European Transonic Windtunnel, Cologne, Germany | | | |

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| **398-GTE-13** | **Noise** | | | | | **Old Town A** |
| Chaired by: B. KIEL, Air Force Reseach Laboratory and S. GOGINENI, Spectral Energies, LLC | | | | | | |
| 1400 hrs<br>AIAA-2016-1880<br>**Level-educed Wavepacket Representation of Noise Radiation from a High-Performance Military Aircraft**<br>T. Neilsen, K. Gee, B. Harker, Brigham Young University, Provo, UT; M. James, Blue Ridge Research and Consulting, LLC, Asheville, NC | 1430 hrs<br>AIAA-2016-1881<br>**Direct Combustion Noise Simulation of a Lean Premixed Swirl Flame using Stochastic Sound Sources**<br>F. Grimm, D. Ohno, S. Werner, M. Stöhr, German Aerospace Center (DLR), Stuttgart, Germany; R. Ewert, J. Dierke, German Aerospace Center (DLR), Braunschweig, Germany; et al. | 1500 hrs<br>AIAA-2016-1882<br>**Reynolds-Averaged Navier-Stokes Solutions and Noise Predictions for Three-Stream Jets**<br>S. Leib, Ohio Aerospace Institute, Cleveland, OH; N. Georgiadis, D. Yoder, NASA Glenn Research Center, Cleveland, OH | 1530 hrs<br>AIAA-2016-1883<br>**An acoustic investigation of a supersonic, multi-stream jet with aft deck: Characterization and acoustically-optimal operating conditions**<br>M. Berry, A. Magstadt, M. Glauser, Syracuse University, Syracuse, NY; C. Ruscher, S. Gogineni, Spectral Energies, LLC, Dayton, OH; B. Kiel, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1600 hrs<br>AIAA-2016-1884<br>**Acoustics from a Rectangular C-D Nozzle Exhausting Over a Flat Surface**<br>P. Mora , F. Baier, E. Gutmark, University of Cincinnati, Cincinnati, OH; K. Kailasanath, Naval Research Laboratory, Washington, D.C. | 1630 hrs<br>AIAA-2016-1885<br>**Impact of Scale on the Acoustics from a Conical C-D Nozzle Interacting with a Flat Surface**<br>F. Baier, P. Mora , E. Gutmark, University of Cincinnati, Cincinnati, OH; K. Kailasanath, Naval Research Laboratory, Washington, D.C. | |

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| **399-GTE-14** | **Experimental tools** | | | | | **Old Town B** |
| Chaired by: R. ANTHONY and S. LAVAGNOLI, von Karman Institute for Fluid Dynamics | | | | | | |
| 1400 hrs<br>AIAA-2016-1886<br>**Experimental investigation of high temperature erosion resistance of thermal barrier coating via design of experiment**<br>D. Shin, A. Hamed, University of Cincinnati, Cincinnati, OH | 1430 hrs<br>AIAA-2016-1887<br>**Uncertainty Analysis of Blade Tip Timing Methods and Reduced Order Modeling of Integrally Bladed Rotors**<br>A. Kamaraj, V. Yadav, S. Venkataraman, San Diego State University, San Diego, CA | 1500 hrs<br>AIAA-2016-1888<br>**Modeling Far-field Acoustical Nonlinearity from F-35 Aircraft during Ground Run-up**<br>B. Reichman, Brigham Young University, Provo, UT; A. Wall, Air Force Research Laboratory, Wright-Patterson AFB, OH; K. Gee, T. Neilsen, Brigham Young University, Provo, UT; J. Downing, M. James, Blue Ridge Research and Consulting, LLC, Asheville, NC; et al. | 1530 hrs<br>AIAA-2016-1889<br>**The Application of Stereoscopic PIV in a Liquid-Fueled Gas Turbine Combustor**<br>A. Pratt, R. Zhang, R. Lucht, C. Slabaugh, Purdue University, West Lafayette, IN | 1600 hrs<br>AIAA-2016-1890<br>**A new thrust stand for testing multi-stream and heat simulated supersonic nozzles**<br>J. Valdez, C. Tinney, University of Texas, Austin, Austin, TX | 1630 hrs<br>AIAA-2016-1891<br>**Measurements and Predictions of the Three-Dimensional Boundary Layer in a Turbine Blade Passage**<br>S. Lynch, Pennsylvania State University, University Park, PA | 1700 hrs<br>AIAA-2016-1892<br>**Separation Control in a 140 degree Bend Channel Using AC and Plasma-sliding-discharge DBD Actuators**<br>M. Arthur, T. Samper, T. Corke, University of Notre Dame, Notre Dame, IN; D. Frias, D. Hanson, N. Nolcheff, Honeywell International, Inc., Phoenix, AZ |

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| **400-HIS-5** | **History of AIAA** | | | | | **Americas Cup A** |
| Chaired by: K. BURNS, Northrop Grumman Corporation | | | | | | |
| 1400 hrs<br>AIAA-2016-1893<br>**The History of the San Diego IAS Building - Currently the San Diego Harbor Police Building**<br>K. Burns, AIAA San Diego Section, San Diego, CA | 1430 hrs<br>AIAA-2016-1894<br>**Howard Marx - The extraordinary life of an aerospace engineer**<br>L. Sweeney, Northrop Grumman Corporation, San Diego, CA | | | | | |

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| **401-SAT-1** | **Society and Aerospace Technology** | | | | | **Americas Cup A** |
| Chaired by: B. STEINFELDT, Georgia Institute of Technology and J. CHRISTIAN, West Virginia University | | | | | | |
| 1400 hrs<br>No Presentations | | | | 1600 hrs<br>AIAA-2016-1895<br>**Applications of UAV in Daily Life**<br>Z. Shahid, A. Rashid, Ghulam Ishaq Khan Institute, Topi, Pakistan | 1630 hrs<br>AIAA-2016-1896<br>**Advancing Socially Disruptive Aerospace Technologies Through Venture Capital Investment**<br>J. Taylor, J. Matthews, Self, Washington, D.C | 1700 hrs<br>AIAA-2016-1897<br>**Medical Astrosociology and Space Medicine: Bringing Together the Two Branches of Science**<br>J. Pass, Astrosociology Research Institute, Huntington Beach, CA |

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| **402-HSABP-7** | **Computational Analysis of Scramjets** | | | | | **Regatta A** |
| Chaired by: H. HASSAN, North Carolina State University and V. TANGIRALA, General Electric | | | | | | |
| 1400 hrs<br>AIAA-2016-1898<br>**Hybrid Reynolds-Averaged / Large Eddy Simulation of Flow in a Model SCRamjet Cavity Flameholder**<br>R. Baurle, NASA Langley Research Center, Hampton, VA | 1430 hrs<br>AIAA-2016-1899<br>**Numerical Predictions of Mixing in a Supersonic Cavity Flameholder**<br>D. Peterson, Innovative Scientific Solutions, Inc., Dayton, OH; E. Hassan, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1500 hrs<br>AIAA-2016-1900<br>**Analysis of Combustion Closure Assumptions in a Dual-Mode Scramjet Combustor**<br>W. Chan, University of Michigan, Ann Arbor, Ann Arbor, MI; M. Ihme, Stanford University, Stanford, CA | 1530 hrs<br>AIAA-2016-1901<br>**A Computational Investigation of Unstart in a Dual-Mode Scramjet**<br>L. Riley, Ohio State University, Columbus, OH; M. Hagenmaier, J. Donbar, Air Force Research Laboratory, Wright-Patterson AFB, OH; D. Gaitonde, Ohio State University, Columbus, OH | | | |

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| **403-IS-11** | **Intelligent Mission Design and Vehicle Control** | | | | | **Regatta B** |
| Chaired by: C. TSCHAN, The Aerospace Corporation and E. KIVELEVITCH, University of Cincinnati | | | | | | |
| 1400 hrs<br>AIAA-2016-1902<br>**Design Exploration of a Low-Thurst Space Trajectory Problem for DESTINY Mission**<br>T. Watanabe, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; T. Tatsukawa, Tokyo University of Science, Shinjuku, Japan; T. Yamamoto, A. Oyama, Y. Kawakatsu, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan | 1430 hrs<br>AIAA-2016-1903<br>**Detection and Localization using Unmanned Aerial Systems for Firefighting Applications**<br>S. Kukreti, M. Kumar, K. Cohen, University of Cincinnati, Cincinnati, OH | 1500 hrs<br>AIAA-2016-1904<br>**Exploring Non-Aviation Information Sources for Aircraft Emergency Landing Planning**<br>P. Di Donato, National Civil Aviation Agency, São José dos Campos, Brazil; E. Atkins, University of Michigan, Ann Arbor, Ann Arbor, MI | 1530 hrs<br>AIAA-2016-1905<br>**A Fuzzy Logic Approach for Low Altitude UAS Traffic Management (UTM)**<br>B. Cook, K. Cohen, E. Kivelevitch, University of Cincinnati, Cincinnati, OH | 1600 hrs<br>AIAA-2016-1906<br>**Empirical Dynamics Learning and Reduction of Motion-Primitive-Based Pattern Generators with Applications to Flapping Wings**<br>I. Sledge, K. Mohseni, University of Florida, Gainesville, Gainesville, FL | | |

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| **404-MDO-8** | **Sensitivity Derivations & Optimization Applications** | | | | | **Balboa A** |
| Chaired by: G. KENNEDY, Georgia Institute of Technology and V. BALABANOV, Boeing Commercial Airplanes | | | | | | |
| 1400 hrs<br>AIAA-2016-1907<br>**A Scalable Adjoint Method for Coupled Flexible Multibody Dynamics**<br>G. Kennedy, Georgia Institute of Technology, Atlanta, GA | 1430 hrs<br>AIAA-2016-1908<br>**Shape Optimization for Two-Dimensional Acoustic Metamaterials and Phononic Crystals with a Time-Dependent Adjoint Formulation**<br>W. Lin, W. Anderson, J. Newman, X. Zhang, University of Tennessee, Chattanooga, Chattanooga, TN | 1500 hrs<br>AIAA-2016-1909<br>**Implementation of discrete adjoint method for parameter sensitivity analysis in chemically reacting flows**<br>M. Esfahani, G. Houzeaux, Barcelona Supercomputing Center, Barcelona, Spain | 1530 hrs<br>AIAA-2016-1910<br>**Time-dependent Aero-acoustic Adjoint-based Shape Optimization of Helicopter Rotors in Forward Flight**<br>E. Fabiano, A. Mishra, D. Mavriplis, University of Wyoming, Laramie, Laramie, WY; K. Mani, Rolls-Royce Group plc, Indianapolis, IN | 1600 hrs<br>AIAA-2016-1911<br>**Trajectory Optimization Procedure for Interplanetary Transfers based on Direct Collocation Method**<br>D. Somavarapu, E. Wahl, A. Westfall, K. Turkoglu, San Jose State University, San Jose, CA | 1630 hrs<br>AIAA-2016-1912<br>**Multi-parametric high-order flow sensitivity analysis**<br>A. Hay, C. Belley, D. Pelletier, Defense Research and Development Canada, Montréal, Canada | |

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| **405-MST-12** | **Computational Methods I** | | | | | **Golden Hill B** |
| Chaired by: M. CARTER, NASA-Langley Research Center and P. GRANT, University of Toronto | | | | | | |
| 1400 hrs<br>AIAA-2016-1913<br>**Numerical Investigation of Scale Factor in Composites Applying Extended Finite Element Method**<br>P. Behroozinia, J. Bayandor, R. Mirzaeifar, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1430 hrs<br>AIAA-2016-1914<br>**Ice release phenomena modelled by Finite Element models**<br>R. Milanese, R. Scigliano, V. De Simone, V. Carandente, Italian Aerospace Research Center (CIRA), Capua, Italy | 1500 hrs<br>AIAA-2016-1915<br>**A VPM/CFD Coupling Methodology to Study Rotor/Ship Aerodynamic Interaction**<br>N. Rajmohan, C. He, Advanced Rotorcraft Technology, Inc., Sunnyvale, CA | 1530 hrs<br>AIAA-2016-1916<br>**Modeling and simulation of the thermal performance of a stratospheric airship with photovoltaic array**<br>Q. Liu, Y. Yang, Z. Li, J. Cai, Chinese Academy of Sciences, Beijing, China | 1600 hrs<br>AIAA-2016-1917<br>**Exploration of POD-Galerkin Techniques for Developing Reduced Order Models of the Euler Equations**<br>C. Huang, W. Anderson, C. Merkle, Purdue University, West Lafayette, IN | 1630 hrs<br>AIAA-2016-1918<br>**Multistep Simulation for Three-dimensinal Ice Accretion on an Aircraft Wing**<br>J. Huang, S. Nie, Y. Cao, Beihang University, Beijing, China; Y. Yao, University of the West of England, Bristol, United Kingdom; J. Yao, University of Lincoln, Lincoln, United Kingdom | |

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| **406-MST-13** | **Model and Simulation Verification and Validation** | | | | | **Golden Hill A** |
| Chaired by: S. KOWALCHUK, Sandia National Laboratories and T. BURRESS, Lockheed Martin Corporation | | | | | | |
| 1400 hrs<br>AIAA-2016-1919<br>**Validation Process of the Physics-based Modeling of Navigation Sensors for Sea-based Aviation Automated Landing**<br>N. Good, O. Aboutalib, B. Thai, N. Yamaoka, Northrop Grumman Corporation, Redondo Beach, CA; C. Kim, Northrop Grumman Corporation, Rolling Meadows, IL; C. Wilkinson, Naval Air Systems Command, Patuxent River, MD; et al. | 1430 hrs<br>AIAA-2016-1920<br>**Upgrades to the Horizon Simulation Framework: Dynamic Model Creation, Scripting, and Multi-thread Support**<br>B. Butler, L-3 Communications, Poway, CA; E. Mehiel, California Polytechnic State University, San Luis Obispo, CA | 1500 hrs<br>AIAA-2016-1921<br>**A Systematic LPV/LFR Modelling Approach Optimized for Linearised Gain Scheduling Control Synthesis**<br>S. Fleischmann, S. Theodoulis, French-German Research Institute of Saint-Louis (ISL), Saint-Louis, France; E. Laroche, University of Strasbourg, Illkirch, France; E. Wallner, MBDA, Schrobenhausen, Germany; J. Harcaut, MBDA, Paris, France | 1530 hrs<br>AIAA-2016-1922<br>**An overview of Model-Based Development Verification/ Validation Processes and Technologies in the Aerospace Industry**<br>J. Allen, dSPACE Inc., Wixom, MI | 1600 hrs<br>AIAA-2016-1923<br>**Consistent Behavioral Abstractions of Experimental Frame**<br>S. Ponnusamy, Airbus, Toulouse, France; V. Albert, National Center for Scientific Research (CNRS), Toulouse, France; P. Thebault, Airbus, Toulouse, France | | |

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| **407-MVC-2** | **Geometry & Computational Environments** | | | | | **Nautical** |
| Chaired by: G. POWER, Aerospace Testing Alliance and J. DANNENHOFFER, Syracuse University | | | | | | |
| 1400 hrs<br>AIAA-2016-1924<br>**CGNS test suites for CFD software components**<br>M. Poinot, ONERA, Châtillon, France | 1430 hrs<br>AIAA-2016-1925<br>**Generation of Multi-fidelity, Multi-discipline Air Vehicle Models with the Engineering Sketch Pad**<br>J. Dannenhoffer, Syracuse University, Syracuse, NY; R. Haimes, Massachusetts Institute of Technology, Cambridge, MA | 1500 hrs<br>AIAA-2016-1926<br>**Generation of Parametric Aircraft Models from a Cloud of Points**<br>P. Jia, J. Dannenhoffer, Syracuse University, Syracuse, NY | 1530 hrs<br>AIAA-2016-1927<br>**NASA CFD Vision 2030 Visualization and Knowledge Extraction: Panel Summary from AIAA AVIATION 2015 Conference**<br>E. Duque, Intelligent Light, Rutherford, NJ; S. Imlay, TecPlot, Inc., Bellevue, WA; S. Ahern, Computational Engineering International, Apex, NJ; C. Guoning, University of Houston, Houston, TX; D. Kao, NASA Ames Research Center, Moffett Field, CA | 1600 hrs<br>AIAA-2016-1928<br>**In Situ Infrastructure Enhancements for Data Extract Generation**<br>B. Whitlock, S. Legensky, Intelligent Light, Rutherford, NJ; J. Forsythe, Naval Air Systems Command, Patuxent River, MD | 1630 hrs<br>AIAA-2016-1929<br>**Snapshot Lagrangian Proper Orthogonal Decomposition of Cylinder Wake Flow**<br>J. Rossetti, J. Dannenhoffer, M. Green, Syracuse University, Syracuse, NY | 1700 hrs<br>AIAA-2016-1930<br>**Unstructured mesh adaptation for functional outputs. With application to two dimensionnal invscid flows.**<br>J. Peter, ONERA, Châtillon, France; J. Desideri, French National Institute for Research in Computer Science and Control (INRIA), Sophia-Antipolis, France |

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| **408-PANEL-11**<br>**1400 - 1600 hrs** | **Thursday Afternoon Forum 360**<br><br>**Learning from Hollywood** | **Seaport F-G** |
| Moderator: Rick Loverd, Program Director, The Science & Entertainment Exchange, National Academy of Sciences | | |

| Thursday, 7 January 2016 | | |
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| **409-MAT-10**<br>**1400 - 1700 hrs** | **Work Force Development for Integrated Computational Materials Engineering** | **Gaslamp B** |

**C. Robert Kenley**
Purdue University

**Sankaran Mahadevan**
Vanderbilt University

**John F. Matlik**
Rolls-Royce Corporation

**Ben H. Thackerr**
Southwest Research Institute

| Thursday, 7 January 2016 | | | | | | |
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| **410-PC-16** | **Rocket & Air-Breathing Combustion I - Combustion Instabilities, Supercritical Conditions** | | | | | **Harbor B** |
| Chaired by: D. TALLEY, and B. HITCH, Reaction Systems | | | | | | |
| 1400 hrs<br>AIAA-2016-1931<br>**Application of Detailed Chemical Kinetics to Combustion Instability Modeling**<br>M. Harvazinski, D. Talley, V. Sankaran, Air Force Research Laboratory, Edwards AFB, CA | 1430 hrs<br>AIAA-2016-1932<br>**Low-Probability Events Leading to Rocket Engine Combustion Instability**<br>P. Popov, A. Sideris, W. Sirignano, University of California, Irvine, Irvine, CA | 1500 hrs<br>AIAA-2016-1933<br>**Effects of Kerosene Annulus Length on Mixing Characteristics of Swirl Coaxial Injectors at Supercritical Conditions**<br>X. Wang, V. Yang, Georgia Institute of Technology, Atlanta, GA | 1530 hrs<br>AIAA-2016-1934<br>**Direct numerical simulation of transcritical turbulent boundary layers at supercritical pressures with strong real fluid effects**<br>S. Kawai, Tohoku University, Sendai, Japan | 1600 hrs<br>AIAA-2016-1935<br>**Simulation of high-pressure methane flames**<br>G. Ribert, P. Domingo, X. Petit, National Center for Scientific Research (CNRS), Rouen, France | | |

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| **411-PC-17** | **Turbulent Combustion III - Large-Eddy Simulations** | | | | | **Harbor C** |
| Chaired by: J. OEFELEIN, Sandia National Laboratories and A. COMER, Air Force Institute of Technology | | | | | | |
| 1400 hrs<br>AIAA-2016-1936<br>**Modeling and Simulation of Bluff Body Stabilized Turbulent Premixed Flames**<br>A. Comer, Air Force Institute of Technology, Wright-Patterson AFB, OH; C. Huang, Purdue University, Purdue University , IN; B. Rankin, M. Harvazinski, V. Sankaran, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1430 hrs<br>AIAA-2016-1937<br>**LES Model Assessment for High Speed Combustion**<br>C. Patton, T. Wignall, J. Edwards, T. Echekki, North Carolina State University, Raleigh, NC | 1500 hrs<br>AIAA-2016-1938<br>**Simulation of the Cold Flow in a Ramp-Cavity Combustor Using a DSEM-LES/FMDF Hybrid Scheme**<br>J. Komperda, Z. Ghiasi, D. Li, F. Mashayek, University of Illinois, Chicago, Chicago, IL; A. Irannejad, F. Jaberi, Michigan State University, East Lansing, MI | 1530 hrs<br>AIAA-2016-1939<br>**Large Eddy Simulation of a Supercritical Fuel Jet in Cross Flow using GPU-Acceleration**<br>K. Gottiparthi, R. Sankaran, Oak Ridge National Laboratory, Oak Ridge, TN; J. Oefelein, Sandia National Laboratories, Livermore, CA | 1600 hrs<br>AIAA-2016-1940<br>**Large eddy simulation of a turbulent premixed jet flame using flamelet-generated manifolds**<br>W. Song, B. Lee, H. Im, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia; A. Donini, A. Fancello, J. van Oijen, Eindhoven University of Technology, Eindhoven, The Netherlands ; et al. | 1630 hrs<br>AIAA-2016-1941<br>**Flamelet Modeling Studies of a Continuously Variable Resonance Combustor**<br>T. Pant, C. Huang, C. Han, S. Sardeshmukh, W. Anderson, H. Wang, Purdue University, West Lafayette, IN | 1700 hrs<br>AIAA-2016-1942<br>**Experimental and numerical investigation into the propagation of entropy waves in a small-scale rig**<br>A. Giusti, N. Worth, E. Mastorakos, A. Dowling, University of Cambridge, Cambridge, United Kingdom |

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| **412-PDL-12** | **Plasma Propulsion** | | | | | **Ocean Beach** |
| Chaired by: S. ROY, University of Florida and K. XU | | | | | | |
| 1400 hrs<br>AIAA-2016-1943<br>**Synchronized Measurement of Plasma Characteristics In a Hall Effect Thruster**<br>D. Cunningham, D. Liu, C. Hartsfield, Air Force Institute of Technology, Wright-Patterson AFB, OH; C. Mullins, C. Farnell, J. Williams, Colorado State University, Fort Collins, CO; et al. | 1430 hrs<br>AIAA-2016-1944<br>**Empirical Determination of Performance Characteristics for Busek 1cm Micro Radio-Frequency Ion Propulsion System**<br>C. Muilenburg, D. Liu, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1500 hrs<br>AIAA-2016-1945<br>**Confined versus Unconfined Analysis of Split Ring Resonator Microplasma Source in a Microwave Electrothermal Thruster**<br>R. Dextre, K. Xu, University of Alabama, Huntsville, Huntsville, AL | 1530 hrs<br>AIAA-2016-1946<br>**Design of Magnetoplasmadynamic Thruster Incorporating Friction Stir Welding Technique**<br>P. Johnson, Hindustan College of Engineering and Technology, Coimbatore, India | | | |

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| **413-SCS-6** | **Spacecraft Solar Array Structures II** | | | | | **Balboa B** |
| Chaired by: R. PAPPA, NASA Langley Research Center and J. FERNANDEZ | | | | | | |
| 1400 hrs<br>AIAA-2016-1947<br>**UltraFlex and MegaFlex – Advancements in Highly Scalable Solar Power**<br>D. Murphy, M. Eskenazi, M. McEachen, J. Spink, ATK, Goleta, CA | 1430 hrs<br>AIAA-2016-1948<br>**Shear Between Straight Ribs in Spirally Stowed Sheets**<br>G. Greschik, TentGuild Engineering Company, Boulder, CO | 1500 hrs<br>AIAA-2016-1949<br>**The Wrapped Architecture for Large Photo-Voltaic Arrays**<br>G. Greschik, TentGuild Engineering Company, Boulder, CO | 1530 hrs<br>AIAA-2016-1950<br>**Ultralight Structures for Space Solar Power Satellites**<br>M. Arya, N. Lee, S. Pellegrino, California Institute of Technology, Pasadena, CA | 1600 hrs<br>AIAA-2016-1951<br>**Robust, Highly Scalable Solar Array System**<br>W. Francis, B. Davis, M. Lake, Roccor, LLC, Louisville, CO | 1630 hrs<br>AIAA-2016-1952<br>**MakerSat: In-Space Additive Manufacturing of Large Truss Structures Using the Trusselator™ Technology**<br>R. Hoyt, J. Slostad, J. Cushing, T. Moser, Tethers Unlimited, Inc., Bothell, WA | |

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| **414-SD-12** | **System ID** | | | | | **Balboa C** |
| Chaired by: V. HRISHIKESHAVAN, University of Maryland and W. WELSH, Sikorsky Aircraft Corporation | | | | | | |
| 1400 hrs<br>AIAA-2016-1953<br>**Identification of Nonlinear Aeroelastic Behavior of a Wing with Pitching and Plunging Freeplay via Higher-Order Spectra Analysis**<br>M. Candon, H. Ogawa, R. Carrese, P. Marzocca, RMIT University, Melbourne, Australia | 1430 hrs<br>AIAA-2016-1954<br>**Dynamic Beam Solutions for Real-Time Simulation and Control Development of Flexible Rockets**<br>W. Su, C. King, University of Alabama, Tuscaloosa, Tuscaloosa, AL; S. Clark, E. Griffin, a.i. solutions, Inc., Cape Canaveral, FL; J. Suhey, M. Wolf, NASA Kennedy Space Center, Cape Canaveral, FL | 1500 hrs<br>AIAA-2016-1955<br>**Flight Shape Estimation of Very Flexible Unmanned Aerial Vehicle**<br>Z. Pang, C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI | 1530 hrs<br>AIAA-2016-1956<br>**Efficient Clustering Algorithm Using Modal Assurance Criterion for System Identification**<br>Z. Wang, D. Sarhaddi, P. Chen, ZONA Technology, Inc., Scottsdale, AZ | 1600 hrs<br>AIAA-2016-1957<br>**Operational Modal Analysis of a Rotating Cantilever Beam Using High-Speed Digital Image Correlation**<br>S. Rizo-Patron, J. Sirohi, University of Texas, Austin, Austin, TX | 1630 hrs<br>AIAA-2016-1958<br>**Modeling of Artificial Hair Sensors for Vibration Control of Flexible Wings**<br>W. Su, University of Alabama, Tuscaloosa, Tuscaloosa, AL; G. Reich, Air Force Research Laboratory, Wright-Patterson AFB, OH | |

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| **415-SD-13** | **Flutter** | | | | | **Gaslamp A** |
| Chaired by: A. SINHA, The Pennsylvania State University and T. BARTKOWICZ, Boeing Defense, Space & Security | | | | | | |
| 1400 hrs<br>AIAA-2016-1959<br>**Classical aeroelastic stability analysis of large composite wind turbine blades**<br>T. Farsadi, A. Kayran, Middle East Technical University, Ankara, Turkey | 1430 hrs<br>AIAA-2016-1960<br>**Wind Tunnel Flutter Testing of a Highly Swept All-Movable Wing with a Control Surface**<br>D. Pitt, B. Sexton, The Boeing Company, St. Louis, MO; K. Byun, Agency for Defense Development, Daejeon, South Korea | 1500 hrs<br>AIAA-2016-1961<br>**Development and Wind Tunnel Test of W-WING Whirl Flutter Aeroelastic Demonstrator**<br>J. Cecrdle, J. Malecek, O. Vich, P. Malinek, Aeronautical Research and Test Institute (VZLÚ), Prague, Czech Republic | 1530 hrs<br>AIAA-2016-1962<br>**Time to Flutter of a Maneuvering Viscoelastic Goland Wing**<br>C. Merrett, Carleton University, Ottawa, Canada | 1600 hrs<br>AIAA-2016-1963<br>**Uncertainties in vibratory mode shapes and their effect on flutter speeds**<br>D. Pitt, The Boeing Company, St. Louis, MO; P. Bansal, The Boeing Company, New Delhi, India | 1630 hrs<br>AIAA-2016-1964<br>**Optimization of High Altitude Long Endurance (HALE) Vehicle Subject to Flutter Speed Constraint**<br>K. Roughen, M. Baker, J. Robinson, M4 Engineering, Inc., Long Beach, CA; Z. Liu, Facebook, Woodland Hills, CA | 1700 hrs<br>AIAA-2016-1965<br>**Experimental investigation of an airfoil response under stall-induced pitching oscillations**<br>F. Marques, University of São Paulo, São Carlos, Brazil; R. Vasconcellos, São Paulo State University, São Joao da Boa Vista, Brazil; D. Pereira, University of São Paulo, São Carlos, Brazil |

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| **416-SOF-8/UMS-9/IS-12**<br>**1400 - 1730 hrs** | **Assurance of Autonomy Symposium IV** | **Coronado A** |

Assurance Tools and Techniques for Trusted Autonomy

In this session, we explore new concepts and methods to facilitate the Verification and Validation (V&V) and Certification of increasingly autonomous systems. Topics that will be addressed include tools and techniques that can be used to assess and assure Safety and Security, as well as engender trust in increasingly autonomous systems, on the behalf of designers, evaluators, users and the general public will be investigated.

We begin with a panel discussion to address these issues, via an interactive Q&A session with the audience. The audience questions will be used to drive and derive directions for investigation that will be captured by the moderators in the report-out. We will then form moderated breakout groups based on the previously identified barriers to assurance, and then identify promising research and development areas.

1400 - 1500 hrs Panelists:

| **Lee Pike** | **Natarajan Shankar** | **Cristoph Torens** | **Darren Cofer** | **Irene Gregory** |
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| Galois | SRI | German Aerospace Center (DLR) | Rockwell Collins | NASA Langley Research Center |

1515 - 1730 hrs Breakout Session We ask that the audience revisit the barriers generated during the previous day and identify promising technologies for autonomy assurance.

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| **417-STR-14** | **Composite Laminate Optimization** | | | | | **La Jolla A** |
| Chaired by: R. TAYLOR, Optimal Structures, LLC. and M. RASSAIAN, Boeing Engineering Operations & Technology | | | | | | |
| 1400 hrs<br>AIAA-2016-1966<br>**Aeroelastic Tailoring of Blended Composite Structures using Lamination Parameters**<br>T. Macquart, N. Werter, R. De Breuker, Delft University of Technology, Delft, The Netherlands | 1430 hrs<br>AIAA-2016-1967<br>**Gradient-Based Optimization of Postbuckled, Steered-Fiber Aircraft Shell Using Equivalent Static Loads**<br>T. Ungwattanapanit, S. Kamath, H. Baier, Technical University of Munich, Garching, Germany | 1500 hrs<br>AIAA-2016-1968<br>**Damping Optimization of Symmetrically Laminated Plates with Shear Deformation using Lamination Parameters**<br>M. Kameyama, A. Takahashi, Shinshu University, Nagano, Japan | 1530 hrs<br>AIAA-2016-1969<br>**Stacking sequence constraints in non-conventional composite laminate optimisation**<br>D. Peeters, M. Abdalla, Delft University of Technology, Delft, The Netherlands | 1600 hrs<br>AIAA-2016-1970<br>**Optimization of variable stiffness composite plates with cut-outs subjected to compression, tension and shear using an adjoint formulation**<br>M. Van Tooren, University of South Carolina, Columbia, Columbia, SC; A. Elham, Delft University of Technology, Delft, The Netherlands | | |

| Thursday, 7 January 2016 | | | | | | |
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| **418-STR-15** | **Buckling, Fatigue, and Fracture of Structures II** | | | | | **La Jolla B** |
| Chaired by: B. BEDNARCYK, NASA Glenn Research Center and M. MOHAGHEGH, Boeing Commercial Airplanes | | | | | | |
| 1400 hrs<br>AIAA-2016-1971<br>**A Discontinuous Shell Element for the Delamination Analysis of Composite Laminates**<br>S. Yazdani, Leibniz University of Hannover, Hannover, Germany; W. Rust, University of Applied Sciences and Arts, Hannover, Germany; P. Wriggers, Leibniz University of Hannover, Hannover, Germany | 1430 hrs<br>AIAA-2016-1972<br>**Buckling Considerations in the Design of Monolithic Machined Aluminum Structures**<br>J. Tucker, S. Russell, B. Mueller, Triumph Aerostructures, Arlington, TX | 1500 hrs<br>AIAA-2016-1973<br>**Efficient and robust shell design of space launcher vehicle structures**<br>L. Friedrich, RWTH Aachen University, Aachen, Germany; M. Ruess, University of Glasgow, Glasgow, United Kingdom; K. Schröder, RWTH Aachen University, Aachen, Germany | 1530 hrs<br>AIAA-2016-1974<br>**Post-Buckling Load Redistribution of Stiffened Panels in Aircraft Wingbox Structures**<br>M. Mert, A. Kayran, Middle East Technical University, Ankara, Turkey | 1600 hrs<br>AIAA-2016-1975<br>**Vibration and Buckling of Quadrilateral Variable Stiffness Laminated Composite Plates**<br>M. Henson, B. Wang, University of Texas, Arlington, Arlington, TX | 1630 hrs<br>AIAA-2016-1976<br>**Parametric Study of Stiffener Variables on Post-Buckling Response of Frame-Stiffened Composite Panels**<br>G. Sanz-Douglass, S. Venkataraman, San Diego State University, San Diego, CA | |

| Thursday, 7 January 2016 | | | | | | |
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| **419-TP-10** | **Experimental Measurements and Techniques in Heat Transfer and Related Physical Phenomena** | | | | | **Harbor G** |
| Chaired by: I. SCHOEGL, Louisiana State University and W. TSAI, Cal Maritime | | | | | | |
| 1400 hrs<br>AIAA-2016-1977<br>**Investigation of Ablative Properties through Advanced Video Analysis: Improving Infrared Measurement through Image-to-Object Calibration**<br>J. Hunt, J. Koo, University of Texas, Austin, Austin, TX | 1430 hrs<br>AIAA-2016-1978<br>**An Experimental Investigation on the Convective Heat Transfer Process over an Ice Roughened Airfoil**<br>Y. Liu, H. Hu, Iowa State University, Ames, IA | 1500 hrs<br>AIAA-2016-1979<br>**Geometry and Test-Time Effects on Hypervelocity Shock-Boundary Layer Interaction**<br>A. Knisely, J. Austin, California Institute of Technology, Pasadena, CA | 1530 hrs<br>AIAA-2016-1980<br>**Thermal Sensitivity Analysis of Avionic and Environmental Control Subsystems to Variations in Flight Condition**<br>A. Jones, T. Childs, R. Chen, Loughborough University, Loughborough, United Kingdom; A. Murray, BAE Systems, Warton, United Kingdom | 1600 hrs<br>AIAA-2016-1981<br>**Spectral, Directional Emittance at Elevated Temperatures for Various Materials**<br>M. Winter, R. Bickel, D. Sekulic, H. Koch, B. Butler, H. Fu, University of Kentucky, Lexington, Lexington, KY | | |

| Thursday, 7 January 2016 | | | | | | |
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| **420-UMS-10** | **Unmanned Systems: Detect-and-Avoid I** | | | | | **Regatta C** |
| Chaired by: V. SCHULTZ, NASA Langley Research Center and R. STANSBURY, Embry-Riddle Aeronautical University | | | | | | |
| 1400 hrs<br>AIAA-2016-1982<br>**Minimum Required Sensing Range for UAS Sense and Avoid Systems**<br>L. Sahawneh, J. Spencer, R. Beard, K. Warnick, Brigham Young University, Provo, UT | 1430 hrs<br>AIAA-2016-1983<br>**Ranging of Aircraft Using Wide-baseline Stereopsys**<br>K. Rigby, C. Reinholtz, T. Wilson, Embry-Riddle Aeronautical University, Daytona Beach, FL | 1500 hrs<br>AIAA-2016-1984<br>**Inexpensive, Efficient, Light-weight Vision-based Collision Avoidance System for Small Unmanned Aerial Vehicles**<br>A. Harmsen, M. Liu, University of British Columbia, Vancouver, Canada | 1530 hrs<br>AIAA-2016-1985<br>**Collision Avoidance System using Stereoscopic Vision for Unmanned Aerial Systems**<br>S. Bhandari, T. Srinivasan, J. Gray, M. Torstenbo, J. Corral, N. Brown, California Polytechnic State University, Pomona, CA; et al. | 1600 hrs<br>AIAA-2016-1986<br>**Vision-Based Proportional Navigation for UAS Collision Avoidance**<br>M. Clark, R. Prazenica, Embry-Riddle Aeronautical University, Daytona Beach, FL | 1630 hrs<br>AIAA-2016-1987<br>**Collision Avoidance System Effectiveness on Low Performance Unmanned Aircraft**<br>E. Londner, Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA | |

| Thursday, 7 January 2016 | | | | | | |
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| 421-WE-10 | Wind Energy: Wind Plant Aerodynamics and Atmospheric Inflow | | | | | Harbor H |
| Chaired by: J. SITARAMAN | | | | | | |
| 1400 hrs<br>AIAA-2016-1988<br>**Large Eddy Simulation of 3 X 3 wind turbine array using Actuator Line model with spectral elements**<br>T. Chatterjee, Y. Peet, Arizona State University, Tempe, AZ | 1430 hrs<br>AIAA-2016-1989<br>**Effect of Inversion-Layer Height and Coriolis Forces on Developing Wind-Farm Boundary Layers**<br>D. Allaerts, J. Meyers, Catholic University of Leuven, Leuven, Belgium | 1500 hrs<br>AIAA-2016-1990<br>**Multiscale Kinematic Simulations of the Stratified Surface Layer and interactions with wind turbine arrays**<br>A. Ghate, S. Lele, Stanford University, Stanford, CA | 1530 hrs<br>AIAA-2016-1991<br>**Coupled Aero-Elastic Multi-Body Simulation of Two-bladed Wind Turbines in Wake Arrays**<br>B. Luhmann, F. Beyer, P. Cheng, University of Stuttgart, Stuttgart, Germany | 1600 hrs<br>AIAA-2016-1992<br>**Measuring power output intermittency and unsteady loading in a micro wind farm model**<br>J. Bossuyt, Catholic University of Leuven, Leuven, Belgium; C. Meneveau, Johns Hopkins University, Baltimore, MD; J. Meyers, Catholic University of Leuven, Leuven, Belgium | | |

| Thursday, 7 January 2016 | | | | | | |
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| 422-WE-11 | Wind Energy: Offshore Wind Systems | | | | | Harbor I |
| Chaired by: J. JONKMAN, National Renewable Energy Laboratory | | | | | | |
| 1400 hrs<br>AIAA-2016-1993<br>**A Comprehensive Aero-Hydro-Structural Analysis of a 5-MW Offshore Wind Turbine System: Towards Cost-Effective Deployment of Offshore Wind Turbines in Maryland**<br>S. Smith, A. Syed, D. Chen, M. Yu, W. Zhu, University of Maryland, Baltimore County, Baltimore, MD; R. Liu, Hangzhou Dianzi University, Hangzhou, China; et al. | 1430 hrs<br>AIAA-2016-1994<br>**On the Development of a Semi-Submersible Offshore Floating Platform and Mooring System for a 13.2 MW Wind Turbine**<br>J. Liu, E. Thomas, L. Manuel, University of Texas, Austin, Austin, TX; D. Griffith, K. Ruehl, M. Barone, Sandia National Laboratories, Albuquerque, NM | 1500 hrs<br>AIAA-2016-1995<br>**Long-Term Loads on a Large Offshore Wind Turbine Supported by a Semi-Submersible Platform**<br>E. Thomas, J. Liu, A. Goyal, L. Manuel, University of Texas, Austin, Austin, TX | 1530 hrs<br>AIAA-2016-1996<br>**An Aeroelastic Perspective of Floating Offshore Wind Turbine Wake Formation and Instabilities**<br>S. Rodriguez, J. Jaworski, Lehigh University, Bethlehem, PA | 1600 hrs<br>AIAA-2016-1997<br>**An Experimental Investigation on the Aeromechanic Performance and Wake Characteristics of a Wind Turbine Model Subjected to Pitch Motions**<br>H. Hu, M. Khosravi, P. Sarkar, Iowa State University, Ames, IA | 1630 hrs<br>AIAA-2016-1998<br>**uncertainty quantification of the levelized cost of energy for a 20 mw research wind turbine model**<br>T. Ashuri, University of Texas, Dallas, Richardson, TX; T. Zhang, Dalian Jiaotong University, Dalian, China; D. Qian, M. Rotea, University of Texas, Dallas, Richardson, TX | |

| Thursday, 7 January 2016 | | |
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| 423-NW-15<br>1530 - 1600 hrs | Thursday Afternoon Networking Coffee Break | Session Room Foyers |

| Thursday, 7 January 2016 | | |
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| 424-NW-16<br>1730 - 1930 hrs | Women at SciTech Happy Hour and Keynote | Seaport F-G |
| **Ann Zulkosky**<br>Director, NASA Programs, Washington Operations<br>Lockheed Martin Corporation | | |

## Friday

| Friday, 8 January 2016 | | |
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| 425-NW-17<br>0700 - 0730 hrs | Friday Early Morning Coffee Break | Session Room Foyers |

| Friday, 8 January 2016 | | |
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| 426-SB-5<br>0730 - 0800 hrs | Friday Morning Speakers' Briefing | Session Rooms |

| Friday, 8 January 2016 | | |
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| 427-PLNRY-5<br>0800 - 0900 hrs | Friday Morning Plenary<br><br>Commercial Use of Unmanned Systems | Seaport A-E |
| Treggon Owens<br>Founding Partner & CEO<br>Aerial MOB, LLC | | |

| Friday, 8 January 2016 | | | | | | |
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| 428-ACD-13 | Aircraft Design Optimization | | | | | Bankers Hill |
| Chaired by: H. JIMENEZ, Georgia Institute of Technology and S. KOMADINA, Northrop Grumman Aerospace Systems | | | | | | |
| 0900 hrs<br>AIAA-2016-1999<br>**Aircraft Design for Best Value**<br>P. Bevilaqua, North American Research Associates, Carlsbad, CA | 0930 hrs<br>AIAA-2016-2000<br>**Multifidelity Conceptual Design and Optimization of Strut-Braced Wing Aircraft using Physics Based Methods**<br>A. Variyar, T. Economon, J. Alonso, Stanford University, Stanford, CA | 1000 hrs<br>AIAA-2016-2001<br>**Aircraft Design Optimization with Artificial Intelligence**<br>N. Cavus, German Aerospace Center (DLR), Hamburg, Germany | 1030 hrs<br>AIAA-2016-2002<br>**Low-Boom / Low-Drag Design Optimization of Innovative Supersonic Transport Configuration**<br>B. Naohiko, W. Yamazaki, Nagaoka University of Technology, Nagaoka, Japan; K. Kusunose, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan | 1100 hrs<br>AIAA-2016-2003<br>**Signomial Programming Models for Aircraft Design**<br>P. Kirschen, E. Burnell, W. Hoburg, Massachusetts Institute of Technology, Cambridge, MA | | |

| Friday, 8 January 2016 | | | | | | |
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| 429-AFM-14 | Aeroserovelastic (ASE) Control, Modeling, Simulation, and Optimization | | | | | Cortez Hill A |
| Chaired by: F. PRIOLO, Millennium Engineering and Integration Company and C. HANSON, NASA-Dryden Flight Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-2004<br>**Control of Limit Cycle Oscillation Amplitudes in Nonlinear Aerelastic Systems using Nonlinear Normal Modes**<br>H. Shukla, M. Patil, Virginia Polytechnic Institute and State University, Blacksburg, VA | 0930 hrs<br>AIAA-2016-2005<br>**Control Surface Buffet Load Measurement using Aircraft Actuators**<br>B. Danowsky, P. Schulze, Systems Technology, Inc., Hawthorne, CA | 1000 hrs<br>AIAA-2016-2006<br>**Adaptive Feedback Control for Gust Loads Alleviation: from Simulation to Wind Tunnel Test**<br>Y. Wang, F. Li, China Academy of Aerospace Aerodynamics, Beijing, China; A. Da Ronch, University of Southampton, Southampton, United Kingdom | 1030 hrs<br>AIAA-2016-2007<br>**High Fidelity Aeroservoelastic Model Reduction Methods**<br>P. Schulze, B. Danowsky, Systems Technology, Inc., Hawthorne, CA; T. Lieu, CMSoft, Inc., Palo Alto, CA | | | |

| Friday, 8 January 2016 | | | | | | |
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| 430-AFM-15 | Flight Test and System Identification II | | | | | Harbor A |
| Chaired by: J. GRAUER, NASA Langley Research Center and Z. PUTNAM, University of Illinois at Urbana-Champaign | | | | | | |
| 0900 hrs<br>AIAA-2016-2008<br>**A Methodology for the Robust Design Optimization of Flight Dynamic System Identification Experiments**<br>J. Dykes, D. Mavris, Georgia Institute of Technology, Atlanta, GA | 0930 hrs<br>AIAA-2016-2009<br>**Parameter Covariance for Aircraft Aerodynamic Modeling using Recursive Least Squares**<br>J. Grauer, NASA Langley Research Center, Hampton, VA | 1000 hrs<br>AIAA-2016-2010<br>**Real-Time Global Nonlinear Aerodynamic Modeling for Learn-To-Fly**<br>E. Morelli, NASA Langley Research Center, Hampton, VA | 1030 hrs<br>AIAA-2016-2011<br>**Online Physical Model Identification for Database-driven Safe Fight Envelope Prediction of Damaged Aircraft**<br>Y. Zhang, C. de Visser, Q. Chu, Delft University of Technology, Delft, The Netherlands | 1100 hrs<br>AIAA-2016-2012<br>**Two-point Aerodynamic Model Identification from Dynamic Wind Tunnel Tests**<br>J. Dias, Brazilian Air Force, São José dos Campos, Brazil; R. Girardi, Technological Institute of Aeronautics (ITA), São José dos Campos, Brazil | 1130 hrs<br>AIAA-2016-2013<br>**Comparison of Time and Frequency Domain Identification of a Fixed-Wing UAV**<br>O. Simsek, S. Haser, E. Orhan, Turkish Aerospace Industries, Ankara, Turkey; O. Tekinalp, Middle East Technical University, Ankara, Turkey | 1200 hrs<br>AIAA-2016-2014<br>**External Stores Grouping for Aero Database Update**<br>T. Khadeeja Nusrath, J. Singh, National Aerospace Laboratory, Banglore, India; A. Saraf, Aeronautical Development Agency, Bangalore, India |

| Friday, 8 January 2016 | | | | | | |
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| **431-AMT-9** | **Surface Pressure and Skin Friction Measurements** | | | | | **Harbor D** |
| Chaired by: J. NAUGHTON, University of Wyoming and C. KLEIN, DLR - German Aerospace Center | | | | | | |
| 0900 hrs<br>AIAA-2016-2015<br>**Skin-Friction Measurements Using a Luminescent Oil-Film and Molecular Tagging Velocimetry**<br>N. Husen, L. Rajendran, Purdue University, West Lafayette, IN; T. Liu, Western Michigan University, Kalamazoo, MI; J. Sullivan, Purdue University, West Lafayette, IN | 0930 hrs<br>AIAA-2016-2016<br>**Characterization of a sapphire optical wall shear stress sensor for high-temperature applications**<br>D. Mills, University of Florida, Gainesville, Gainesville, FL; D. Blood, Valparaiso University, Valparaiso, IN; M. Sheplak, University of Florida, Gainesville, Gainesville, FL | 1000 hrs<br>AIAA-2016-2017<br>**Unsteady PSP Measurements on a Rectangular Cube**<br>N. Roozeboom, S. Murman, NASA Ames Research Center, Moffett Field, CA; L. Diosady, Science and Technology Corporation, Moffett Field, CA; N. Burnside, J. Ross, NASA Ames Research Center, Moffett Field, CA | 1030 hrs<br>AIAA-2016-2018<br>**Polymer/Ceramic PSP with Reduced Surface Roughness for Unsteady Pressure Measurement in Transonic Flow**<br>Y. Sugioka, D. Numata, K. Asai, Tohoku University, Sendai, Japan; S. Koike, K. Nakakita, T. Nakajima, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan | 1100 hrs<br>AIAA-2016-2019<br>**Comparison of Blur Elimination Techniques for PSP Images of Rotating Surfaces**<br>A. Pandey, J. Gregory, Ohio State University, Columbus, OH; S. Stanfield, J. Crafton, Innovative Scientific Solutions, Inc., Dayton, OH | 1130 hrs<br>AIAA-2016-2020<br>**Pressure/Temperature Distribution on the Surface of a Free-Flight Object Measured by PSP/TSP**<br>M. Ishii, National Research Institute of Police Science, Japan, Kashiwa, Japan; H. Goya, T. Miyazaki, University of Electro-Communications, Chofu, Japan; H. Sakaue, University of Notre Dame, Notre Dame, IN | |

| Friday, 8 January 2016 | | | | | | |
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| **432-APA-41** | **Applied CFD & Numerical Correlations with Experimental Data IV** | | | | | **Americas Cup D** |
| Chaired by: K. CHITALE, Rensselaer Polytechnic Institute | | | | | | |
| 0900 hrs<br>AIAA-2016-2021<br>**A global time integration approach for realistic unsteady flow computations**<br>P. Eliasson, Swedish Defense Research Agency (FOI), Stockholm, Sweden; T. Lundquist, J. Nordstrom, Linköping University, Linköping, Sweden | 0930 hrs<br>AIAA-2016-2022<br>**Validation of Steady RANS Simulations Conducted on the High Maneuverability Airframe Using Magnetic Resonance Velocimetry Water Channel Testing**<br>M. Wells, C. Snow, C. Coyle, A. Coulter, J. Spirnak, E. Youn, U.S. Military Academy, West Point, NY; et al. | 1000 hrs<br>AIAA-2016-2023<br>**Validation of a Transonic Lattice-Boltzmann Method on the NASA Common Research Model**<br>B. Konig, E. Fares, Exa GmbH, Stuttgart, Germany | 1030 hrs<br>AIAA-2016-2024<br>**Stability Derivative Computation of Tailless Aircraft using Variable-Fidelity Aerodynamic Analysis for Control Performance Analysis**<br>J. Park, J. Choi, Virginia Polytechnic Institute and State University, Blacksburg, VA; Y. Jo, Korea Advanced Institute of Science and Technology, Daejeon, South Korea ; S. Choi, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1100 hrs<br>AIAA-2016-2025<br>**Flight Behaviors of a Complex Projectile using a Coupled CFD-based Simulation Technique: Open-loop Control**<br>J. Sahu, F. Fresconi, Army Research Laboratory, Aberdeen Proving Ground, MD | | |

| Friday, 8 January 2016 | | | | | | |
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| **433-APA-42** | **Aerodynamic-Structural Dynamics Interactions II** | | | | | **Coronado D** |
| Chaired by: V. VENKATESH, and C. PASILIAO, AFRL/RWWV | | | | | | |
| 0900 hrs<br>AIAA-2016-2026<br>**Aero-Structural Design Optimization of Adaptive Shock Control Bumps**<br>E. Jinks, P. Bruce, M. Santer, Imperial College London, London, United Kingdom | 0930 hrs<br>AIAA-2016-2027<br>**Analysis and Computational Study of The Aerodynamics, Aeroelasticity And Flight Dynamics of Flapping Wing Ornithopter Using Linear Approximation**<br>H. Djojodihardjo, Putra University, Serdang, Malaysia | 1000 hrs<br>AIAA-2016-2028<br>**A Parametric Study of Factors Affecting Transonic Shock Oscillation**<br>N. Giannelis, G. Vio, University of Sydney, Sydney, Australia | | | | |

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| **434-APA-43** | **Lowspeed Flow Environment and UAV Integration** | | | | | **Americas Cup C** |
| Chaired by: D. HUNSAKER, Blucraft, LLC | | | | | | |
| 0900 hrs<br>AIAA-2016-2029<br>**Design and Development of a 3D Printed Unmanned Aerial Vehicle**<br>C. Banfield, J. Kidd, J. Jacob, Oklahoma State University, Stillwater, OK | 0930 hrs<br>AIAA-2016-2030<br>**Numerical Simulations of Parachute Aerodynamic Characteristics under Severe Weather**<br>T. Wan, C. Cheng, R. Huo, Tamkang University, Taipei, Taiwan | 1000 hrs<br>AIAA-2016-2031<br>**Stabilization of Helicopter Sling Loads with Passive and Active Control Surfaces**<br>D. Cyr, P. Guarino, J. Hitchen, R. Morar, J. Sperry, R. Cowlagi, Worcester Polytechnic Institute, Worcester, MA; et al. | | | | |

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| **435-APA-44** | **Special Session: Low Boom Activities** | | | | | **Coronado E** |
| Chaired by: K. WAITHE, Gulfstream Aerospace Corporation and S. CLIFF, NASA-Ames | | | | | | |
| 0900 hrs<br>AIAA-2016-2032<br>**A New F-Function for the Low-Boom Aircraft Design with Trim Requirement**<br>Y. Kasuga, University of Tokyo, Kashiwa, Japan; K. Yoshida, Japan Aerospace Exploration Agency (JAXA), Mitaka, Japan; H. Ishikawa, ASIRI Corporation, Chiyoda, Japan | 0930 hrs<br>AIAA-2016-2033<br>**Multi-fidelity Low-boom Design Based on Near-field Pressure Signature**<br>A. Ueno, M. Kanamori, Y. Makino, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan | 1000 hrs<br>AIAA-2016-2034<br>**Computational and Experimental Study of Supersonic Nozzle Flow and Aft-Deck Interactions**<br>W. Bruce, University of Virginia, Charlottesville, Charlottesville, VA; M. Carter, A. Elmiligui, C. Winski, NASA Langley Research Center, Hampton, VA; S. Nayani, Analytical Services & Materials, Inc., Hampton, VA; R. Castner, NASA Glenn Research Center, Cleveland, OH | 1030 hrs<br>AIAA-2016-2035<br>**Wind Tunnel Model Design for Sonic Boom Studies of Nozzle Jet Flow with Shock Interactions**<br>S. Cliff, NASA Ames Research Center, Moffett Field, CA; M. Denison, S. Moini-Yekta, Science and Technology Corporation, Moffett Field, CA; D. Morr, Millennium Engineering and Integration Company, Moffett Field, CA; D. Durston, NASA Ames Research Center, Moffett Field, CA | 1100 hrs<br>AIAA-2016-2036<br>**Numerical Examination of Shock Generator Geometries and Nozzle Plume Effects on Pressure Signature**<br>J. Pearl, University of Vermont, Burlington, Burlington, VT; M. Carter, A. Elmiligui, C. Winski, NASA Langley Research Center, Hampton, VA; S. Nayani, Analytical Services & Materials, Inc., Hampton, VA | 1130 hrs<br>AIAA-2016-2037<br>**A Space Marching Method for Sonic Boom Near Field Predictions**<br>H. Shen, The Boeing Company, Hazelwood, MO; D. Lazzara, The Boeing Company, Huntington Beach, CA | |

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| **436-APA-45** | **Airfoil/Wing/Configuration Aerodynamics III** | | | | | **Americas Cup B** |
| Chaired by: C. TILMANN, Air Force Research Laboratory and M. CONWAY, The Aerospace Corporation | | | | | | |
| 0900 hrs<br>AIAA-2016-2038<br>**Beyond the Elliptical Span Load: Optimizing Minimum Induced Drag Using Enhanced Leading Edge Suction**<br>T. Takahashi, C. Barchfeld, Arizona State University, Tempe, AZ | 0930 hrs<br>AIAA-2016-2039<br>**Aerodynamic Performance of a Small-Scale Wingsail Vessel**<br>M. Anderson, University of California, San Diego, La Jolla, CA | 1000 hrs<br>AIAA-2016-2040<br>**Effects of Wake Shapes on High-Lift System Aerodynamic Predictions**<br>W. Bissonnette, G. Bramesfeld, Ryerson University, Toronto, Canada | 1030 hrs<br>AIAA-2016-2041<br>**Aerodynamic Design of Transonic Natural-Laminar-Flow (NLF) Wing via Surrogate-based Optimization**<br>Z. Han, J. Chen, Z. Zhu, W. Song, Northwestern Polytechnical University, Xi'an, China | 1100 hrs<br>AIAA-2016-2042<br>**Post-Stall Performance Improvement through Bio-inspired Passive Covert Feathers**<br>A. Altman, G. Allemand, University of Dayton, Dayton, OH | | |

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| **437-DA-2** | **Avionics Technologies for Safe and Efficient Vehicle Operation in National Airspace** | | | | | **Regatta A** |
| Chaired by: M. UIJT DE HAAG, Ohio University and B. KORN, DLR - German Aerospace Center | | | | | | |
| 0900 hrs<br>AIAA-2016-2043<br>**Evaluating Technologies for Improved Airplane State Awareness and Prediction**<br>S. Young, NASA Langley Research Center, Hampton, VA; M. Uijt De Haag, Ohio University, Athens, OH; T. Daniels, E. Evans, NASA Langley Research Center, Hampton, VA; K. Shish, Millennium Engineering and Integration Company, Moffett Field, CA; S. Schuet, NASA Ames Research Center, Moffett Field, CA; et al. | 0930 hrs<br>AIAA-2016-2044<br>**Assessing Dual Sensor Enhanced Flight Vision Systems to Enable Equivalent Visual Operations**<br>L. Kramer, NASA Langley Research Center, Hampton, VA; T. Etherington, Rockwell Collins, Cedar Rapids, IA; K. Severance, R. Bailey, S. Williams, S. Harrison, NASA Langley Research Center, Hampton, VA | 1000 hrs<br>AIAA-2016-2045<br>**The Use of Enhanced Vision Systems for See-and-Avoid During Surface Operations**<br>R. Bailey, NASA Langley Research Center, Hampton, VA | | | | |

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| **438-DSC-6** | **Aeroelasticity** | | | | | **Balboa C** |
| Chaired by: R. SCOTT, NASA Langley Research Center and D. PITT, Boeing Engineering Operations & Technology | | | | | | |
| 0900 hrs<br>AIAA-2016-2046<br>**Modeling and Simulation of Flexible Jet Transport Aircraft with Aeroelastically Tailored High-Aspect-Ratio Wings**<br>R. Kitson, C. Lupp, C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI | 0930 hrs<br>AIAA-2016-2047<br>**Aeroelastic Ground Wind Loads Analysis Tool for Launch Vehicles**<br>T. Ivanco, NASA Langley Research Center, Hampton, VA | 1000 hrs<br>AIAA-2016-2048<br>**Aeroelasticity of Flexible Airfoils with Arbitrary Camber Deformations**<br>W. Su, C. King, University of Alabama, Tuscaloosa, Tuscaloosa, AL | 1030 hrs<br>AIAA-2016-2049<br>**Nonlinear transient Fluid/ Structure interaction approach using surrogate models: Industrial application to aircraft fairing vibration excited by engine efflux.**<br>E. Bosco, A. Lucchetti, S. Trapier, Airbus, Toulouse, France; F. Di Vincenzo, MSC Software Corporation, Toulouse, France; J. Morlier, N. Gourdain, University of Toulouse, Toulouse, France | 1100 hrs<br>AIAA-2016-2050<br>**Status of the KTH-NASA Wind-Tunnel Test for Acquisition of Transonic Nonlinear Aeroelastic Data**<br>W. Silva, NASA Langley Research Center, Hampton, VA; U. Ringertz, D. Eller, Royal Institute of Technology (KTH), Stockholm, Sweden; D. Keller, NASA Langley Research Center, Hampton, VA | | |

| Friday, 8 January 2016 | | | | | | |
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| **439-FD-54** | **CFD: Overset Methods** | | | | | **Pier** |
| Chaired by: M. GALBRAITH and S. SHERER, US Air Force | | | | | | |
| 0900 hrs<br>AIAA-2016-2051<br>**High-Order Overset Interpolation via Weighted Least-Square Polynomials Reconstruction for Finite Volume CFD**<br>J. Le Gouez, ONERA, Châtillon, France | 0930 hrs<br>AIAA-2016-2052<br>**Deformable Overset Grid for Unsteady Aerodynamic Simulation**<br>T. Xiao, N. Qin, University of Sheffield, Sheffield, United Kingdom; D. Luo, Nanjing University of Aeronautics and Astronautics, Nanjing, China; S. Deng, Delft University of Technology, Delft, The Netherlands | 1000 hrs<br>AIAA-2016-2053<br>**A Multi-Solver Overset Mesh Approach for 3D Mixed Element Variable Order Discretizations**<br>M. Brazell, A. Kirby, J. Sitaraman, D. Mavriplis, University of Wyoming, Laramie, Laramie, WY | 1030 hrs<br>AIAA-2016-2054<br>**A implicit, discontinuous Galerkin Chimera solver using automatic differentiation**<br>N. Wukie, P. Orkwis, University of Cincinnati, Cincinnati, OH | 1100 hrs<br>AIAA-2016-2055<br>**A mixed overset grid/immersed boundary approach for CFD simulations of complex geometries**<br>S. Péron, C. Benoit, V. Gleize, I. Mary, M. Terracol, ONERA, Châtillon, France | 1130 hrs<br>AIAA-2016-2056<br>**Recent Developments of the Navier Stokes Multi Block (NSMB) CFD solver.**<br>Y. Hoarau, D. Pena, University of Strasbourg, Strasbourg, France; J. Vos, D. Charbonier, CFS Engineering, Lausanne, Switzerland; A. Gehri, RUAG Aviation, Emmen, Switzerland; M. Braza, Fluid Mechanics Institute of Toulouse (IMFT), Toulouse, France; et al. | |

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| **440-FD-55** | **High-Speed Flow Methods & Simulations** | | | | | **Harbor E** |
| Chaired by: K. DURAISAMY, University of Michigan, Ann Arbor and R. GOSSE, WPAFB | | | | | | |
| 0900 hrs<br>AIAA-2016-2057<br>**Shape Optimization of a Blunt Body in Hypersonic Rarefied and Reacting Flow for Reducing Both Drag and Heat Transfer**<br>G. Huang, S. Gardner, E. Zishka, C. Seager, R. Agarwal, Washington University in St. Louis, St. Louis, MO | 0930 hrs<br>AIAA-2016-2058<br>**Numerical Investigation of the Near-Field of a Supersonic Multistream Jet**<br>C. Stack, D. Gaitonde, Ohio State University, Columbus, OH | 1000 hrs<br>AIAA-2016-2059<br>**Recovery of Freestream Acoustic Disturbances from Stagnation Pressure Spectrum in Hypersonic Flow**<br>R. Chaudhry, G. Candler, University of Minnesota, Minneapolis, Minneapolis, MN | 1030 hrs<br>AIAA-2016-2060<br>**Simulation of Hypersonic Flows using a Particle-based Ellipsoidal Statistical Bhatnagar-Gross-Krook Method**<br>O. Tumuklu, D. Levin, University of Illinois, Urbana-Champaign, Urbana, IL | 1100 hrs<br>AIAA-2016-2061<br>**Construction Methodology of Weighted Upwind Compact Scheme**<br>Z. Wang, H. Al-Dujaly, C. Liu, University of Texas, Arlington, Arlington, TX | 1130 hrs<br>AIAA-2016-2062<br>**A Decoupled Method for the Roe FDS Scheme in the Reacting Gas Path of FUN3D**<br>K. Thompson, P. Gnoffo, NASA Langley Research Center, Hampton, VA | |

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| **441-FD-56** | **Incompressible Flow Transition** | | | | | **Harbor F** |
| Chaired by: E. WHITE, Texas A&M University | | | | | | |
| 0900 hrs<br>AIAA-2016-2063<br>**The Effect of Acoustic Forcing on Instabilities and Breakdown in Swept-Wing Flow Over a Backward-Facing Step**<br>J. Eppink, NASA Langley Research Center, Hampton, VA; O. Shishkov, Georgia Institute of Technology, Atlanta, GA; R. Wlezien, Iowa State University, Ames, IA; R. King, M. Choudhari, NASA Langley Research Center, Hampton, VA | 0930 hrs<br>AIAA-2016-2064<br>**Self-Contradictions in Classical and Current Turbulence Theory and New Turbulence Genearation Theory**<br>C. Liu, University of Texas, Arlington, Arlington, TX | 1000 hrs<br>AIAA-2016-2065<br>**The Interaction of a Swept-Wing Boundary Layer with Surface Excrescences**<br>T. Saeed, M. Mughal, J. Morrison, Imperial College London, London, United Kingdom | 1030 hrs<br>AIAA-2016-2066<br>**A Quantitative Investigation of Surface Roughness Effects on Airfoil Boundary Layer Transition Using Infrared Thermography**<br>T. Beeby, J. Ackermann, C. Langel, R. Chow, C. Van Dam, University of California, Davis, Davis, CA; T. Raffius, RWTH Aachen University, Aachen, Germany | 1100 hrs<br>AIAA-2016-2067<br>**Evaluation of Miniature Vortex Generators for Flow Control in Falkner–Skan Boundary Layers**<br>R. Downs, B. Fallenius, J. Fransson, Royal Institute of Technology (KTH), Stockholm, Sweden; H. Mårtensson, GKN Aerospace Engine Systems, Trollhättan, Sweden | 1130 hrs<br>AIAA-2016-2068<br>**New Vortex Identification Method and Vortex Ring Development Analysis in Boundary Layer Transition**<br>C. Liu, Y. Wang, J. Tang, University of Texas, Arlington, Arlington, TX | |

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| **442-FD-57** | **Pitching/Heaving/Flapping Surfaces** | | | | | **Cove** |
| Chaired by: K. MOORED, Lehigh University and B. GANAPATHISUBRAMANI, University of Southampton | | | | | | |
| 0900 hrs<br>AIAA-2016-2069<br>**Lift Enhancement of High Angle of Attack Airfoils Using Periodic Pitching**<br>S. Dawson, Princeton University, Princeton, NJ; M. Hemati, University of Minnesota, Minneapolis, Minneapolis, MN; D. Floryan, C. Rowley, Princeton University, Princeton, NJ | 0930 hrs<br>AIAA-2016-2070<br>**On Optimal Oscillating-Foil Power Generation in Free and Constrained Flow**<br>F. Karakas, B. Zaloglu, I. Fenercioglu, Istanbul Technical University, Istanbul, Turkey; C. Hoke, J. Young, J. Lai, University of New South Wales, Canberra, Australia; et al. | 1000 hrs<br>AIAA-2016-2071<br>**Proper Orthogonal Decomposition Analysis of 3-D Wake Structures in a Pitching-Rolling Plate**<br>C. Li, H. Dong, University of Virginia, Charlottesville, Charlottesville, VA; Z. Liang, Ohio State University, Columbus, OH | 1030 hrs<br>AIAA-2016-2072<br>**A Vortex Sheet/Point Vortex Dynamical Model For Unsteady Separated Flows**<br>D. Darakananda, J. Eldredge, University of California, Los Angeles, Los Angeles, CA; T. Colonius, California Institute of Technology, Pasadena, CA; D. Williams, Illinois Institute of Technology, Chicago, IL | 1100 hrs<br>AIAA-2016-2073<br>**Effects of Structural Motion on the Aerodynamics of the X-56A Airfoil**<br>C. Mertens, S. Pineda, M. Agate, J. Little, University of Arizona, Tucson, Tucson, AZ; A. Gross, New Mexico State University, Las Cruces, NM; H. Fasel, University of Arizona, Tucson, Tucson, AZ | 1130 hrs<br>AIAA-2016-2074<br>**Transient aerodynamics of large transverse gusts and geometrically similar maneuvers**<br>G. Perrotta, A. Jones, University of Maryland, College Park, College Park, MD | |

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| **443-FD-58** | **Separated Fluid Flows** | | | | | **Promenade B** |
| Chaired by: R. SCHMIT, USAF AFRL | | | | | | |
| 0900 hrs<br>AIAA-2016-2075<br>**Hydrodynamic Wave Generation inside a Rectangular Cavity**<br>R. Schmit, Air Force Research Laboratory, Wright-Patterson AFB, OH | 0930 hrs<br>AIAA-2016-2076<br>**Stereoscopic Particle Image Velocimetry measurement of transonic flow over three-dimensional open cavities of complex geometry**<br>E. Demauro, S. Beresh, J. Wagner, J. Henfling, R. Spillers, Sandia National Laboratories, Albuquerque, NM | 1000 hrs<br>AIAA-2016-2077<br>**The Effect of Inflow Mach Number on the Reattachment in Subsonic Flow over a Backward-Facing Step**<br>D. Li, Z. Ghiasi, J. Komperda, F. Mashayek, University of Illinois, Chicago, Chicago, IL | 1030 hrs<br>AIAA-2016-2078<br>**PIV Investigation in the Centreline Plane of a Pressure-Induced Turbulent Separation Bubble.**<br>M. Abdelouahab, J. Weiss, University of Québec, Montréal, Canada | | | |

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| **444-FD-59** | **Vortex Flows III: Dynamical Systems Methods** | | | | | **Promenade A** |
| Chaired by: D. SMITH, Air Force Office of Scientific Research AFOSR and M. GREEN, Syracuse University | | | | | | |
| 0900 hrs<br>AIAA-2016-2079<br>**Spatiotemporal analysis of fluctuating base pressure and velocity in a blunt trailing edge wake**<br>H. Clark, P. Lavoie, University of Toronto, Toronto, Canada | 0930 hrs<br>AIAA-2016-2080<br>**Correlation of the Surface Pressure Distribution on a Circular Cylinder with Objective Identification of Vortex Formation and Shedding**<br>M. Rockwood, M. Green, Syracuse University, Syracuse, NY | 1000 hrs<br>AIAA-2016-2081<br>**Detection of Near Wall Flow Features Using Surface Pressure Data**<br>C. Marks, R. Sondergaard, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1030 hrs<br>AIAA-2016-2082<br>**Comparing leading and trailing edge vortex circulation history with vortex identification and tracking methods**<br>Y. Huang, M. Green, Syracuse University, Syracuse, NY | 1100 hrs<br>AIAA-2016-2083<br>**Numerical Investigation of Flow Asymmetry Around Slender Body at High Angles of Attack**<br>I. AlQadi, E. Eljack, King Abdulaziz University, Jeddah, Saudi Arabia | 1130 hrs<br>AIAA-2016-2084<br>**Numerical Analysis of a Trailing Edge with Triangular Serrations Using Dynamic Mode Decomposition**<br>N. Thomareis, G. Papadakis, Imperial College London, London, United Kingdom | |

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| **445-GNC-37** | **Invited Session: Flight Experience of Cassini Spacecraft Attitude Control at Saturn** | | | | | **Coronado B** |
| Chaired by: T. BURK, Jet Propulsion Laboratory and J. WEBSTER, Jet Propulsion Laboratory | | | | | | |
| 0900 hrs<br>Video Presentation<br>**Ring World 4 - New Results from the Cassini Mission at Saturn** | 0930 hrs<br>AIAA-2016-2085<br>**The Cassini Reaction Wheels: Drag and Spin-Rate Trends from an Aging Interplanetary Spacecraft at Saturn**<br>T. Brown, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | 1000 hrs<br>AIAA-2016-2086<br>**Risk Assessment of Cassini Sun Sensor Performance Degradation due to Hypervelocity Impact Of Ring Dust Particles**<br>A. Lee, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | 1030 hrs<br>AIAA-2016-2087<br>**Thruster-Specific Force Estimation and Trending of Cassini Hydrazine Thrusters at Saturn**<br>J. Stupik, T. Burk, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | 1100 hrs<br>AIAA-2016-2088<br>**Cassini Operational Sun Sensor Risk Management During Proximal Orbit Saturn Ring Plane Crossings**<br>D. Bates, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | 1130 hrs<br>AIAA-2016-2089<br>**Trending Main Engine Assembly (MEA) Cover Actuator Performance using Cassini Attitude Control Flight Data**<br>L. Andrade, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | 1200 hrs<br>AIAA-2016-2090<br>**Extended Bright Bodies – Flight and Ground Software Challenges on the Cassini Mission at Saturn**<br>T. Sung, T. Burk, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA |

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| **446-GNC-38** | **Vision-Based Sensing and Optical Navigation** | | | | | **Hillcrest A** |
| Chaired by: L. POLLINI, University of Pisa and S. WOICKE | | | | | | |
| 0900 hrs<br>AIAA-2016-2091<br>**A Vision-aided Nonlinear Observer for Fixed-wing UAV Navigation**<br>J. Hosen, Kongsberg Defence Systems, Kjeller, Norway; H. Helgesen, L. Fusini, T. Fossen, T. Johansen, Centre for Autonomous Operations and Systems, Trondheim, Norway | 0930 hrs<br>AIAA-2016-2092<br>**Position-Based Visual Servoing for Target Tracking by a Quadrotor UAV**<br>M. Popova, H. Liu, University of Toronto, Toronto, Canada | 1000 hrs<br>AIAA-2016-2093<br>**Interplanetary Optical Navigation**<br>V. Adams, M. Peck, Cornell University, Ithaca, NY | 1030 hrs<br>AIAA-2016-2094<br>**Robust Measurement Planning for Intersatellite Laser Ranging**<br>M. Salvoldi, D. Choukroun, Ben Gurion University of the Negev, Beer Sheva, Israel | 1100 hrs<br>AIAA-2016-2095<br>**Detection and Identification of Objects Using Point Cloud Data for Pose Estimation**<br>A. Suqi, T. Lim, U.S. Naval Academy, Annapolis, MD | 1130 hrs<br>AIAA-2016-2096<br>**Vision Navigation Sensor (VNS) with Adaptive Electronically Steerable Flash LIDAR (ESFL)**<br>R. Rohrschneider, C. Weimer, J. Masciarelli, M. Lieber, C. Adkins, J. Domber, Ball Aerospace & Technologies Corporation, Boulder, CO | 1200 hrs<br>AIAA-2016-2097<br>**Enhancing Inertial Navigation with Structure from Motion Trajectory Estimates**<br>J. Tharp, B. Woolley, Air Force Institute of Technology, Wright-Patterson AFB, OH |

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| **447-GNC-39** | **Flight Control of Unmanned Vehicles** | | | | | **Hillcrest C** |
| Chaired by: D. SCHMIDT, Retired f/University of Colorado and M. GROS, Institute of Flight Mechanics and Flight Control | | | | | | |
| 0900 hrs<br>AIAA-2016-2098<br>**Autonomous Waypoint Transitioning and Loitering for UnmannedAerial Vehicles via Hybrid Control**<br>D. Smith, Raytheon Company, Tucson, AZ; R. Sanfelice, University of California, Santa Cruz, Santa Cruz, CA | 0930 hrs<br>AIAA-2016-2099<br>**Stability Augmentation and Active Flutter Suppression of a Flexible Flying-Wing Drone**<br>D. Schmidt, University of Colorado, Colorado Springs, Colorado Springs, CO | 1000 hrs<br>AIAA-2016-2100<br>**UAV Collision Avoidance based on the Solution of the Suicidal Pedestrian Differential Game**<br>I. Exarchos, P. Tsiotras, Georgia Institute of Technology, Atlanta, GA; M. Pachter, Air Force Institute of Technology, Wright-Patterson AFB, OH | 1030 hrs<br>AIAA-2016-2101<br>**Unified Approach for Velocity Control and Flight State Transition of Unmanned Tiltwing Aircraft**<br>P. Hartmann, C. Meyer, D. Moormann, RWTH Aachen University, Aachen, Germany | 1100 hrs<br>AIAA-2016-2102<br>**Robust Design of Close Formation Flight Control via Uncertainty and Disturbance Estimator**<br>Q. Zhang, H. Liu, University of Toronto, Toronto, Canada | | |

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| **448-GNC-40** | **Intelligent and Cooperative Control in Aerospace Applications** | | | | | **Cortez Hill B** |
| Chaired by: J. CONNOLLY, NASA Glenn Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-2103<br>**A Cooperative Pursuit Strategy for a High Speed Evader**<br>V. Makkapati, M. Kothari, Indian Institute of Technology Kanpur, Kanpur, India | 0930 hrs<br>AIAA-2016-2104<br>**Collective Circular Motion and Cooperative Circumnavigation for Nonholonomic Mobile Robots Using Range-based Measurements**<br>Y. Cao, University of Texas, San Antonio, San Antonio, TX; D. Casbeer, Air Force Research Laboratory, Wright-Patterson AFB, OH; D. Milutinovic, University of California, Santa Cruz, Santa Cruz, CA; D. Kingston, Air Force Research Laboratory, Wright-Patterson AFB, OH | 1000 hrs<br>AIAA-2016-2105<br>**Analysis of UAV Kinematic Constraints for Rigid Formation Flying**<br>V. Challa, A. Ratnoo, Indian Institute of Science, Bangalore, India | 1030 hrs<br>AIAA-2016-2106<br>**Scalable Cooperative Control Algorithms For the Weapon Target Assignment Problem**<br>K. Volle, J. Rogers, Georgia Institute of Technology, Atlanta, GA; K. Brink, Air Force Research Laboratory, Eglin AFB, FL | 1100 hrs<br>AIAA-2016-2107<br>**Optimal Continuous-Time Job Scheduling for Multiple Low Earth Orbit Satellites**<br>D. Cho, H. Kim, H. Choi, Korea Advanced Institute of Science and Technology, Daejeon, South Korea | 1130 hrs<br>AIAA-2016-2108<br>**A Beam Rider Concept For Three Point Aerial Rendezvous Guidance**<br>P. Anjaly, A. Ratnoo, Indian Institute of Science, Bangalore, India | 1200 hrs<br>AIAA-2016-2109<br>**MAV Waypoint Guidance with Arrival Angle and Time Scheduling Constraints**<br>A. Saleem, A. Ratnoo, Indian Institute of Science, Bangalore, India |

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| **449-GNC-41** | **Missile and Entry Vehicle Guidance** | | | | | **Hillcrest B** |
| Chaired by: S. WELLS, Raytheon Missile Systems and P. VERNIS, AIRBUS Defence and Space | | | | | | |
| 0900 hrs<br>AIAA-2016-2110<br>**A Composite Guidance for Dual Range AAM with Side Jet Control**<br>D. Taur, National Chung-Shan Institute of Science and Technology, Taipei, Taiwan | 0930 hrs<br>AIAA-2016-2111<br>**Inverse Optimal Sliding Mode Guidance Law against Maneuvering Targets**<br>S. He, D. Lin, J. Wang, Beijing Institute of Technology, Beijing, China | 1000 hrs<br>AIAA-2016-2112<br>**Nonlinear Impact Angle Control Guidance Law for Stationary Targets**<br>U. Ates, ROKETSAN Missile Industries, Inc., Ankara, Turkey | 1030 hrs<br>AIAA-2016-2113<br>**Precision Munition Guidance and Estimation of Target Position in 2-D**<br>S. Sreeja, Indian Institute of Technology Bombay, Mumbai, India; H. Hablani, Indian Institute of Technology Gandhinagar, Ahmedabad, India | 1100 hrs<br>AIAA-2016-2114<br>**A Pitch Controlled Impact-Angle-Constrained Guidance Law for Surface-to-Surface Missiles**<br>S. Varma, H. Parwana, M. Kothari, Indian Institute of Technology Kanpur, Kanpur, India | 1130 hrs<br>AIAA-2016-2115<br>**Onboard Trajectory Generation for Entry Vehicles via Adaptive Multivariate Pseudospectral Interpolation**<br>M. Sagliano, German Aerospace Center (DLR), Bremen, Germany; E. Mooij, Delft University of Technology, Delft, The Netherlands ; S. Theil, German Aerospace Center (DLR), Bremen, Germany | |

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| **450-GT-9** | **Ground Test Methodologies and CFD Integration** | | | | | **Hillcrest D** |
| Chaired by: S. RYLE, San Diego Wind Tunnel and C. JORGENS, The Boeing Company | | | | | | |
| 0900 hrs<br>AIAA-2016-2116<br>**Migration and deposition characteristics of lunar dust on the optical element surface in the simulated electrostatic environment**<br>Q. Chen, Beijing Jiaotong University , Beijing, China; X. Chen, Dongfengrichan Vehicle, Guangzhou, China | 0930 hrs<br>AIAA-2016-2117<br>**Numerical Simulation of a Complete Low-Speed Wind Tunnel Circuit**<br>S. Nayani, W. Sellers, A. Tinetti, Analytical Services & Materials, Inc., Hampton, VA; S. Brynildsen, ViGYAN, Inc., Hampton, VA; E. Walker, NASA Langley Research Center, Hampton, VA | 1000 hrs<br>AIAA-2016-2118<br>**Hypersonic Boundary Layer Transition Experiments in Hypervelocity Ballistic Range G**<br>T. Swanson, D. Daniel, Arnold Engineering Development Complex, Arnold AFB, TN | 1030 hrs<br>AIAA-2016-2119<br>**Wind Tunnel Manoeuvre Rig: A Multi-DOF Test Platform for Model Aircraft**<br>S. Araujo-Estrada, University of Bristol, Bristol, United Kingdom; Z. Gong, Nanjing University of Aeronautics and Astronautics, Nanjing, China; M. Lowenberg, S. Neild, University of Bristol, Bristol, United Kingdom; M. Goman, De Montfort University, Leicester, United Kingdom | | | |

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| **451-GTE-15** | **Combustion III** | | | | | **Gaslamp B** |
| Chaired by: J. GORE, Purdue University and S. JAMES, Honeywell Inc. | | | | | | |
| 0900 hrs<br>AIAA-2016-2120<br>**Flamelet Generated Manifolds for Partially Premixed, Highly Stretched and Non-Adiabatic Combustion in Gas Turbines**<br>N. Klarmann, T. Sattelmayer, Technical University of Munich, Garching, Germany; W. Geng, F. Magni, GE Power, Baden, Switzerland | 0930 hrs<br>AIAA-2016-2121<br>**Emission Characteristics of A P&W Axially Staged Sector Combustor**<br>Z. He, NASA Glenn Research Center, Cleveland, OH; K. Kopp-Vaughan, Pratt & Whitney, Hartford, CT; C. Wey, C. Chang, NASA Glenn Research Center, Cleveland, OH; A. Cheung, Pratt & Whitney, Hartford, CT; C. Lee, NASA Glenn Research Center, Cleveland, OH; et al. | 1000 hrs<br>AIAA-2016-2122<br>**Enhancing Flow Migration and Reducing Emissions in Full Annular Ultra Compact Combustor**<br>N. Gilbert, A. Cottle, M. Polanka, Air Force Institute of Technology, Wright-Patterson AFB, OH; L. Goss, Innovative Scientific Solutions, Inc., Dayton, OH | 1030 hrs<br>AIAA-2016-2123<br>**LES of a sooting flame in a pressurized swirl combustor**<br>H. Koo, V. Raman, University of Michigan, Ann Arbor, Ann Arbor, MI; M. Mueller, Princeton University, Princeton, NJ; K. Geigle, German Aerospace Center (DLR), Stuttgart, Germany | 1100 hrs<br>AIAA-2016-2124<br>**Estimation and Comparison of Particle Number Emission Factors for Petroleum-based and Camelina Biofuel Blends used in a Honeywell TFE-109 Turbofan Engine**<br>J. Shila, M. Johnson, Purdue University, West Lafayette, IN | | |

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| **452-GTE-16** | **Numerical Tools** | | | | | **Old Town A** |
| Chaired by: T. SHIH, Purdue University and P. TUCKER, The Whittle Laboratory | | | | | | |
| 0900 hrs<br>AIAA-2016-2125<br>**Impact of the Specific Heat Ratio On the Noise Generation in a High-Temperature Supersonic Jet**<br>J. Liu, A. Corrigan, K. Kailasanath, B. Taylor, Naval Research Laboratory, Washington, D.C. | 0930 hrs<br>AIAA-2016-2126<br>**Unsteady Simulations of the Wellborn Diffusing S-Duct**<br>R. Watson, P. Tucker, University of Cambridge, Cambridge, United Kingdom; K. Menzies, Rolls-Royce Group plc, Bristol, United Kingdom | 1000 hrs<br>AIAA-2016-2127<br>**Effect of Labyrinth Seal Configurations on Leakage Performance using LES**<br>Y. Dai, J. Tyacke, P. Tucker, Cambridge University, Cambridge, United Kingdom | 1030 hrs<br>AIAA-2016-2128<br>**Novel Design and Fabrication of JetCat P90 Diffuser using Parametric Design and Optimization Tools**<br>J. Holden, T. Caley, B. Heberling, C. Cantor, E. Wesseling, A. Hamed, University of Cincinnati, Cincinnati, OH; et al. | 1100 hrs<br>AIAA-2016-2129<br>**Wavepacket modeling from full-scale military jet noise beamforming analyses**<br>B. Harker, T. Neilsen, K. Gee, Brigham Young University, Provo, UT; A. Wall, Air Force Research Laboratory, Wright-Patterson AFB, OH; M. James, Blue Ridge Research and Consulting, LLC, Asheville, NC | 1130 hrs<br>AIAA-2016-2130<br>**Hierarchical Immersed Boundary Method with Smeared Geometry**<br>T. Cao, University of Cambridge, Cambridge, United Kingdom; P. Hield, Rolls-Royce Group plc, Filton, United Kingdom; P. Tucker, University of Cambridge, Cambridge, United Kingdom | |

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| **453-IS-13** | **Intelligent Integrated Systems Health Management** | | | | | **Regatta B** |
| Chaired by: J. FIGUEROA, NASA Stennis Space Center and C. KULKARNI, NASA Ames Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-2131<br>**Predicting Real-Time Safety Margins in the National Airspace System**<br>I. Roychoudhury, L. Spirkovska, M. Daigle, S. Sankararaman, E. Balaban, C. Kulkarni, NASA Ames Research Center, Moffett Field, CA; et al. | 0930 hrs<br>AIAA-2016-2132<br>**End-of-discharge and End-of-life Prediction in Lithium-ion Batteries with Electrochemistry-based Aging Models**<br>M. Daigle, C. Kulkarni, NASA Ames Research Center, Moffett Field, CA | 1000 hrs<br>AIAA-2016-2133<br>**Review of Proactive Safety Metrics for Rotorcraft Operations and Improvements Using Model-Based Parameter Synthesis and Data Fusion**<br>A. Payan, A. Gavrilovski, H. Jimenez, D. Mavris, Georgia Institute of Technology, Atlanta, GA | 1030 hrs<br>AIAA-2016-2134<br>**A Generic Modeling Process to Support Functional Fault Model Development**<br>W. Maul, J. Hemminger, Vantage Partners, LLC, Brook Park, OH; R. Oostdyk, SGT, Inc., Cape Canaveral, FL; R. Bis, NnR Engineering, Cleveland, OH | 1100 hrs<br>AIAA-2016-2135<br>**Analysis of Helicopter Maintenance Risk from Accident Data**<br>A. Rao, N. Fala, K. Marais, Purdue University, West Lafayette, IN | | |

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| **454-MST-14** | **Rotorcraft Modeling and Simulation Technologies** | | | | | **Golden Hill A** |
| Chaired by: M. WHITE, The University of Liverpool and M. SEKULA, NASA-Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-2136<br>**Coupled Flight Dynamics and CFD Simulations of Rotorcraft/Terrain Interactions**<br>I. Oruc, J. Horn, Pennsylvania State University, University Park, PA; J. Shipman, CRAFT Tech, Pipersville, PA | 0930 hrs<br>AIAA-2016-2137<br>**Control Augmentation Strategies for Helicopters used as Personal Aerial Vehicles**<br>C. Gerboni, Max Planck Institute for Biological Cybernetics, Tübingen, Germany; A. Joos, University of Stuttgart, Stuttgart, Germany; F. Nieuwenhuizen, Max Planck Institute for Biological Cybernetics, Tübingen, Germany; W. Fichter, University of Stuttgart, Stuttgart, Germany; H. Buelthoff, Max Planck Institute for Biological Cybernetics, Tübingen, Germany | 1000 hrs<br>AIAA-2016-2138<br>**An Investigation of Task Specific Motion Cues for Rotorcraft Simulators**<br>M. White, University of Liverpool, Liverpool, United Kingdom; S. Manso, Australian National University, Melbourne, Australia; S. Hodge, BAE Systems, Preston, United Kingdom | 1030 hrs<br>AIAA-2016-2139<br>**Implementation and Validation of a 6 Degrees-of-Freedom Nonlinear Helicopter Model**<br>C. Gerboni, F. Nieuwenhuizen, H. Buelthoff, Max Planck Institute for Biological Cybernetics, Tübingen, Germany | 1100 hrs<br>AIAA-2016-2140<br>**CFD Validation of a Designed Quad-Rotor**<br>C. Zhou, D. Schrage, Georgia Institute of Technology, Atlanta, GA | | |

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| **455-MST-15** | **Computational Methods II** | | | | | **Golden Hill B** |
| Chaired by: D. GINGRAS, Bihrle Applied Research Inc. and M. SMITH, Georgia Institute of Technology | | | | | | |
| 0900 hrs<br>AIAA-2016-2141<br>**Aerodynamic Influences on the Modeling and Simulation of Instabilities on Dynamic Tethered Loads**<br>O. Nabipour, J. Clinton, T. Ma, D. Prosser, M. Smith, Georgia Institute of Technology, Atlanta, GA | 0930 hrs<br>AIAA-2016-2142<br>**Mesh Adaptation and Optimization for Discontinuous Galerkin Methods Using a Continuous Mesh Model**<br>A. Rangarajan, A. Balan, G. May, RWTH Aachen University, Aachen, Germany | 1000 hrs<br>AIAA-2016-2143<br>**Numerical Analysis of an External Store Separation From an Airplane**<br>A. Osman, A. Aly, E. Khalil, O. Abdelattif, Cairo University, Cairo, Egypt | 1030 hrs<br>AIAA-2016-2144<br>**Function Extrapolation of Noisy Data using Converging Lines**<br>Y. Zhang, N. Kim, C. Park, R. Haftka, University of Florida, Gainesville, Gainesville, FL | | | |

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| **456-NW-18**<br>**0900 - 0930 hrs** | **Friday Late Morning Networking Coffee Break** | **Session Room Foyers** |

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| **457-PC-18** | **Rocket & Air-Breathing Combustion II** | | | | | **Harbor B** |
| Chaired by: B. CHEHROUDI, European Research Council (ERC) and V. RAMAN, University of Michigan | | | | | | |
| 0900 hrs<br>AIAA-2016-2145<br>**Study of the Combustion of Beeswax and Beeswax With Aluminum Powder in Hybrid Propellant Rocket Engine**<br>V. Naoumov, H. Nguyen, B. Alcalde, Central Connecticut State University, New Britain, CT | 0930 hrs<br>AIAA-2016-2146<br>**Formulation of Equations to Describe the Thermomechanical Response of a Gas to Transient, Spatially Resolved Thermal Energy Addition: Applications to LPRE Stability Physics**<br>D. Kassoy, University of Colorado, Boulder, Boulder, CO | 1000 hrs<br>AIAA-2016-2147<br>**Numerical Investigation of Rocket Engine Combusting Flowfields**<br>G. Ranuzzi, L. Cutrone, D. Cardillo, M. Invigorito, Italian Aerospace Research Center (CIRA), Capua, Italy | 1030 hrs<br>AIAA-2016-2148<br>**Numerical Simulations of a Single Injector Gaseous Methane Rocket Combustion Chamber**<br>R. Keller, P. Gerlinger, University of Stuttgart, Stuttgart, Germany | 1100 hrs<br>AIAA-2016-2149<br>**Modeling Fuel Film Cooling on Rocket Engine Walls**<br>J. Bills, D. Crowe, J. Rutledge, Air Force Institute of Technology, Wright-Patterson AFB, OH; E. Coy, Air Force Research Laboratory, Edwards AFB, CA | 1130 hrs<br>AIAA-2016-2150<br>**Effect of Nozzle Spacing on NOx Emissions and Lean Operability**<br>B. Dolan, R. Villalva Gomez, University of Cincinnati, Cincinnati, OH; S. Pack, United Technologies Corporation, West Des Moines, IA; E. Gutmark, University of Cincinnati, Cincinnati, OH | |

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| **458-PC-19** | **Turbulent Combustion IV** | | | | | **Harbor C** |
| Chaired by: J. MILLER, Air Force Research Laboratory | | | | | | |
| 0900 hrs<br>AIAA-2016-2151<br>**On Radiative Heat Transfer Modeling in Numerical Simulation of a Heavy Duty Steam Generator**<br>M. Darbandi, B. Abrar, M. Barezban, Sharif University of Technology, Tehran, Iran ; G. Schneider, University of Waterloo, Waterloo, Canada; Y. Shamsaei, M. Nematollahi, Abadan Oil Refining Company, Abadan, Iran | 0930 hrs<br>AIAA-2016-2152<br>**Radiation-Based Validation of Combustion Simulations and Comparison to Heat Release in Rocket Engines**<br>M. Schulze, T. Fiala, T. Sattelmayer, Technical University of Munich, Munich, Germany | 1000 hrs<br>AIAA-2016-2153<br>**Adjoint-based sensitivity analysis of localized ignition in a non-premixed hydrogen-air mixing layer**<br>J. Capecelatro, R. Vishnampet, D. Bodony, J. Freund, University of Illinois, Urbana-Champaign, Urbana, IL | 1030 hrs<br>AIAA-2016-2154<br>**An Integrated Predictive Simulation Model for the Plasma-Assisted Ignition of a Fuel Jet in a Turbulent Crossflow**<br>L. Massa, J. Freund, University of Illinois, Urbana-Champaign, Urbana, IL | 1100 hrs<br>AIAA-2016-2155<br>**Numerical Investigation of Transverse Forcing in a Multi-Element, Shear-Coaxial, High Pressure Combustor**<br>P. Tudisco, R. Ranjan, S. Menon, Georgia Institute of Technology, Atlanta, GA | 1130 hrs<br>AIAA-2016-2156<br>**Experimental Investigation of the Response of Premixed and Non-premixed Turbulent Flames to Acoustic Forcing.**<br>A. Kypraiou, N. Worth, E. Mastorakos, University of Cambridge, Cambridge, United Kingdom | |

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| **459-PDL-13** | **Numerical Modeling of Plasmas** | | | | | **Ocean Beach** |
| Chaired by: M. WHITE, Ohio Aerospace Institute and L. RAJA, University of Texas at Austin | | | | | | |
| 0900 hrs<br>AIAA-2016-2157<br>**Numerical simulation of DC glow discharges for shock wave modification**<br>K. Kourtzanidis, L. Raja, University of Texas, Austin, Austin, TX; S. Coumar, V. Lago, Laboratoire ICARE, CNRS, Orléans, France | 0930 hrs<br>AIAA-2016-2158<br>**Premixed combustion simulations with a self-consistent plasma model for initiation.**<br>H. Sitaraman, R. Grout, National Renewable Energy Laboratory, Golden, CO | 1000 hrs<br>AIAA-2016-2159<br>**Magnetized Electron Flow Calculation Using a Hyperbolic System**<br>R. Kawashima, K. Komurasaki, T. Schönherr, H. Koizumi, University of Tokyo, Tokyo, Japan | 1030 hrs<br>AIAA-2016-2160<br>**Hypersonic BL Transition and Separation Control by Transient Electrical Discharge**<br>A. Houpt, University of Notre Dame, Notre Dame, IN; F. Falempin, MBDA, Paris, France; S. Leonov, University of Notre Dame, Notre Dame, IN | 1100 hrs<br>AIAA-2016-2161<br>**Experimental and Kinetic Modeling Studies of Novel Carbon Monoxide Gas Lasers**<br>K. Frederickson, M. Yurkovich, E. Jans, A. Chernukho, Z. Eckert, J. Rich, Ohio State University, Columbus, OH; et al. | 1130 hrs<br>AIAA-2016-2162<br>**Investigating the Influence of DBD Plasma Actuators on the Skin Friction in Integral Boundary Layer Formulation**<br>S. Bal, R. Balbino Dos Santos Pereira , G. L. de Oliveira Andrade , D. Ragni, Delft University of Technology, Delft, The Netherlands | |

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| **460-SCS-7** | **Packaging and Deployment of Spacecraft Structures** | | | | | **Balboa B** |
| Chaired by: G. DAVIS, Jet Propulsion Laboratory and M. THOMSON | | | | | | |
| 0900 hrs<br>AIAA-2016-2163<br>**In-Space Structural Assembly: Applications and Technology**<br>W. Belvin, W. Doggett, J. Watson, J. Dorsey, J. Warren, T. Jones, NASA Langley Research Center, Hampton, VA; et al. | 0930 hrs<br>AIAA-2016-2164<br>**Methods for Characterizing the Reliability of Deployable Modules for Large Optical Reflectors**<br>K. Hogstrom, S. Pellegrino, California Institute of Technology, Pasadena, CA | 1000 hrs<br>AIAA-2016-2165<br>**Starshade Mechanical Architecture & Technology Effort**<br>D. Webb, B. Hirsch, V. Bach, J. Sauder, S. Bradford, M. Thomson, California Institute of Technology, Pasadena, CA | 1030 hrs<br>AIAA-2016-2166<br>**Starshade Deployable Inner Disk Structure Design and Development**<br>B. Hirsch, D. Webb, M. Thomson, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA | 1100 hrs<br>AIAA-2016-2167<br>**Deployment Properties with Gravity Compensation Devices for Boom-Membrane Integrated Wrapped Structures**<br>H. Furuya, T. Yokomatsu, H. Sakamoto, Y. Satou, Tokyo Institute of Technology, Ookayana, Japan | 1130 hrs<br>AIAA-2016-2168<br>**Novel Folding Methods for Deterministic Deployment of Common Space Structures**<br>D. Kling, Folded Structures Company, Ringoes, NJ; S. Jeon, LoadPath, LLC, Albuquerque, NM; J. Banik, Air Force Research Laboratory, Kirtland AFB, NM | 1200 hrs<br>AIAA-2016-2169<br>**Structural Dynamic Response of Deployable Thin Shell Reflector in Folded Configuration**<br>O. Soykasap, S. Karakaya, A. Gayretli, Y. Akcin, Afyon Kocatepe University, Afyonkarahisar, Turkey |

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| **461-SD-14** | **Dynamic Loads, Response, and Vibration II** | | | | | **Gaslamp A** |
| Chaired by: W. SCHNEIDER, Lockheed Martin Aeronautics and B. WILLIS, Jacobs Technology | | | | | | |
| 0900 hrs<br>AIAA-2016-2170<br>**Substructure Versus Property-Level Dispersed Modes Calculation**<br>E. Stewart, J. Peck, NASA Marshall Space Flight Center, Huntsville, AL; C. Fulcher, Jacobs, Huntsville, AL; T. Bush, TriVector Services, Inc., Huntsville, AL | 0930 hrs<br>AIAA-2016-2171<br>**Acoustic Analysis of A Partially Open Spacecraft Cavity using Multi-Domain Boundary Element Method**<br>D. Inoyama, R. Agarwal, T. Stoumbos, ATK, Dulles, VA | 1000 hrs<br>AIAA-2016-2172<br>**Assessing Sine and Random Stresses and Fatigue Life**<br>M. Baker, ATA Engineering, Inc., San Diego, CA | 1030 hrs<br>AIAA-2016-2173<br>**Non-Stationary Random Vibration Analysis Using Multi-Correlated Random Processes Excitations**<br>Y. Li, Southeast University, Nanjing, China; S. Mulani, University of Alabama, Tuscaloosa, Tuscaloosa, AL; R. Kapania, Virginia Polytechnic Institute and State University, Blacksburg, VA; S. Wu, Q. Fei, Southeast University, Nanjing, China | 1100 hrs<br>AIAA-2016-2174<br>**Exploring Entropy for Continuous Systems**<br>D. Tufano, Z. Sotoudeh, Rensselaer Polytechnic Institute, Troy, NY | | |

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| **462-STR-16** | **Special Session: Stiffened, Stitched Composite Structures** | | | | | **La Jolla A** |
| Chaired by: A. LOVEJOY, NASA-Langley Research Center and A. PRZEKOP, NASA Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-2175<br>**Testing of a Stitched Composite Large-Scale Pressure Box**<br>D. Jegley, M. Rouse, A. Przekop, A. Lovejoy, NASA Langley Research Center, Hampton, VA | 0930 hrs<br>AIAA-2016-2176<br>**Testing and Analysis of a Composite Non-Cylindrical Aircraft Fuselage Structure, Part I: Ultimate Design Loads**<br>A. Przekop, D. Jegley, A. Lovejoy, M. Rouse, NASA Langley Research Center, Hampton, VA; H. Wu, The Boeing Company, Huntington Beach, CA | 1000 hrs<br>AIAA-2016-2177<br>**Testing and Analysis of a Composite Non-Cylindrical Aircraft Fuselage Structure, Part II: Severe Damage**<br>A. Przekop, D. Jegley, A. Lovejoy, M. Rouse, NASA Langley Research Center, Hampton, VA; H. Wu, The Boeing Company, Huntington Beach, CA | 1030 hrs<br>AIAA-2016-2178<br>**Imparting Barely Visible Impact Damage to a Stitched Composite Large-Scale Pressure Box**<br>A. Lovejoy, A. Przekop, NASA Langley Research Center, Hampton, VA | 1100 hrs<br>AIAA-2016-2179<br>**Compressive Loading and Modeling of Stitched Composite Stiffeners**<br>F. Leone, D. Jegley, NASA Langley Research Center, Hampton, VA; K. Linton, The Boeing Company, Huntington Beach, CA | 1130 hrs<br>AIAA-2016-2180<br>**Tension and Bending Testing of an Integral T-cap for Stitched Composite Airframe Joints**<br>A. Lovejoy, F. Leone, NASA Langley Research Center, Hampton, VA | |

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| **463-STR-17** | **Impact Damage in Composites** | | | | | **La Jolla B** |
| Chaired by: V. RANATUNGA, Air Force Research Laboratory and T. MANN, NASA-Langley Research Center | | | | | | |
| 0900 hrs<br>AIAA-2016-2181<br>**Low Velocity Impact Test and Analysis of Laminated Structures**<br>M. Falugi, Air Force Research Laboratory, Wright-Patterson AFB, OH | 0930 hrs<br>AIAA-2016-2182<br>**Modeling Axial Impact Response of Sandwich Panels using Probability-Based Finite Element Analysis**<br>W. Ji, Ulsan National Institute of Science and Technology, Ulsan, South Korea ; A. Waas, University of Washington, Seattle, Seattle, WA | 1000 hrs<br>AIAA-2016-2183<br>**Correlating Impact, Micro CT Inspection, and Residual Strength of Carbon/Epoxy Rods**<br>D. Jensen, L. Stanford, Brigham Young University, Provo, UT | 1030 hrs<br>AIAA-2016-2184<br>**Prediction of Low-Velocity Face-on Impact Response of Composite Laminates using High-Fidelity Finite Element Modeling Techniques**<br>S. Thorsson, University of Michigan, Ann Arbor, Ann Arbor, MI; A. Yoshimura, A. Waas, University of Washington, Seattle, Seattle, WA; M. Rassaian, The Boeing Company, Seattle, WA | | | |

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| **464-TP-11** | **Thermal Systems and Devices: Cryogenics, Thermal Management, and Microdevices** | | | | | **Harbor G** |
| Chaired by: A. WILLIAMS, Air Force Reseach Laboratory and M. MARTIN, Louisiana State University | | | | | | |
| 0900 hrs<br>AIAA-2016-2185<br>**Cavitation Instabilities in an Inducer Using Heated Water as a Cryogenic Simulant**<br>D. Jackson, J. Schwille, J. Davitian, The Aerospace Corporation, El Segundo, CA; C. Lettieri, V. Wang, Z. Spakovszky, Massachusetts Institute of Technology, Cambridge, MA | 0930 hrs<br>AIAA-2016-2186<br>**Pulse Chilldown Tests of a Tank-to-Tank Liquid Hydrogen Propellant Transfer Line**<br>J. Hartwig, NASA Glenn Research Center, Cleveland, OH; E. Rame, Universities Space Research Association, Cleveland, OH; J. McQuillen, NASA Glenn Research Center, Cleveland, OH | 1000 hrs<br>AIAA-2016-2187<br>**Numerical Simulation for Ice Accretion on Rotating Cowling Considering Water Film Shedding**<br>Z. Mu, X. Shen, G. Lin, X. Bu, Beihang University, Beijing, China | 1030 hrs<br>AIAA-2016-2188<br>**Thermo-Mechanical Simulation of Crooke's Cantilevers in the Free-Molecular Flow Regime**<br>M. Martin, W. Schmieder, Louisiana State University, Baton Rouge, LA | 1100 hrs<br>AIAA-2016-2189<br>**Hydraulic-Powered Forced Convection Heat Transfer**<br>E. Van Wijk, J. Valdes , K. Pope, Y. Muzychka, Memorial University of Newfoundland, St. John's, Canada | 1130 hrs<br>AIAA-2016-2190<br>**A Study into Refrigeration Cycle Working Fluids using an Air Cycle Machine Environmental Control System**<br>T. Childs, A. Jones, R. Chen, Loughborough University, Loughborough, United Kingdom; A. Murray, BAE Systems, Warton, United Kingdom | |

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| **465-TP-12** | **Special Session: University Space Systems Programs and Microgravity Flight Activities** | | | | | **Harbor H** |
| Chaired by: E. SILK, NASA-Goddard Space Flight Center and P. YEE, The Aerospace Corporation | | | | | | |
| 0900 hrs<br>AIAA-2016-2191<br>**From ISS to Mars: Twenty Years of University of Kentucky Student Microgravity and Space Systems Experiments**<br>S. Smith, University of Kentucky, Lexington, Lexington, KY; J. Rexroat, Bluegrass Embedded Systems, Lexington, KY | 0930 hrs<br>AIAA-2016-2192<br>**Kentucky Re-entry Universal Payload System**<br>J. Cooper, J. Stieha, A. Fowler, A. Martin, University of Kentucky, Lexington, Lexington, KY | 1000 hrs<br>Oral Presentation<br>**Virginia Tech Spaceflight Programs**<br>J. Black, G. Earle, R. McGwier, Virginia Polytechnic Institute and State University, Blacksburg, VA | 1030 hrs<br>Oral Presentation<br>**The University of Tennessee Space Institute: Historic Accomplishments and New Horizons for Space Related Research**<br>T. Moeller, J. Schmisseur, University of Tennessee Space Institute, Tullahoma, TN | 1100 hrs<br>Oral Presentation<br>**Astronautical Engineering at USC: Ten Years After**<br>M. Gruntman, University of Southern California, Los Angeles, CA | 1130 hrs<br>AIAA-2016-2193<br>**Small Probe Flight Testing of Thermal Protection Systems in Simulated Earth Entries**<br>A. Sidor, T. Anderson, R. Braun, Georgia Institute of Technology, Atlanta, GA | |

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| **466-UMS-11** | **Unmanned Systems: Detect-and-Avoid II** | | | | | **Regatta C** |
| Chaired by: R. STANSBURY, Embry-Riddle Aeronautical University and R. CHRISTIANSEN, Sierra Lobo, Inc. | | | | | | |
| 0900 hrs<br>AIAA-2016-2194<br>**Optimization-Based Path Planning for Separation Assurance on Small Unmanned Aircraft**<br>M. Duffield, A. Ning, T. McLain, Brigham Young University, Provo, UT | 0930 hrs<br>AIAA-2016-2195<br>**Unmanned Aircraft System Sense and Avoid Integrity and Continuity: Uncertainty in Aircraft Dynamics**<br>M. Jamoom, M. Joerger, B. Pervan, Illinois Institute of Technology, Chicago, IL | 1000 hrs<br>AIAA-2016-2196<br>**Path-Planning around Obstacles for a Quadrotor UAV Using the RRT Algorithm for Indoor Environments**<br>S. Bhandari, T. Srinivasan, California Polytechnic State University, Pomona, CA | 1030 hrs<br>AIAA-2016-2197<br>**UAV Collision Avoidance using a Predictive Rapidly-Exploring Random Tree (RRT)**<br>S. Bhandari, J. Farinella, C. Lay, California Polytechnic State University, Pomona, CA | | | |

| Friday, 8 January 2016 | | | | | | |
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| 467-WE-12 | Wind Energy: Wind Plant Optimization | | | | | Harbor I |
| Chaired by: M. LACKNER, University of Massachusetts | | | | | | |
| 0900 hrs<br>AIAA-2016-2198<br>**Towards Wind Farm Layout Design Using Sensitivity Derivatives Obtained from a Parabolic Method**<br>A. Mittal, K. Sreenivas, W. Briley, L. Taylor, University of Tennessee, Chattanooga, Chattanooga, TN | 0930 hrs<br>AIAA-2016-2199<br>**Adjoint Optimization of wind Farm Layouts for Systems Engineering Analysis**<br>R. King, P. Hamlington, University of Colorado, Boulder, Boulder, CO; K. Dykes, P. Graf, National Renewable Energy Laboratory, Golden, CO | 1000 hrs<br>AIAA-2016-2200<br>**Reduced order model for optimization of power production from a wind farm**<br>G. Iungo, University of Texas, Dallas, Richardson, TX; F. Viola, Swiss Federal Institute of Technology, Lausanne, Switzerland; U. Ciri, S. Leonardi, M. Rotea, University of Texas, Dallas, Richardson, TX | 1030 hrs<br>AIAA-2016-2201<br>**Wind Farm Modeling and Control Using Dynamic Mode Decomposition**<br>J. Annoni, J. Nichols, P. Seiler, University of Minnesota, Minneapolis, Minneapolis, MN | | | |



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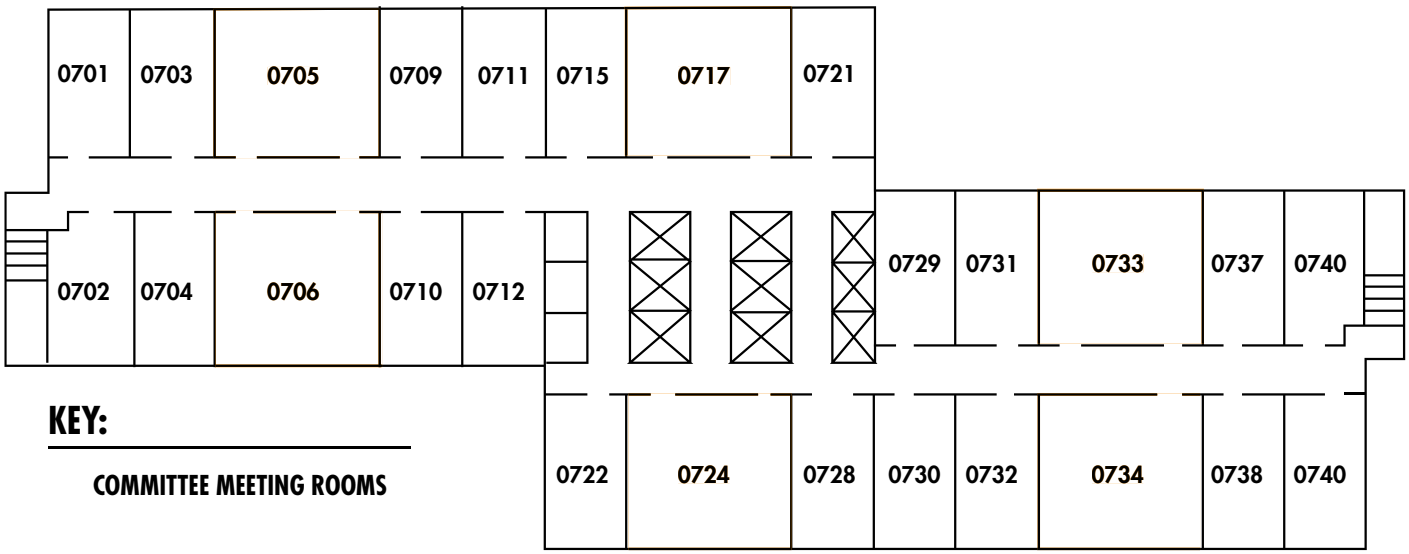

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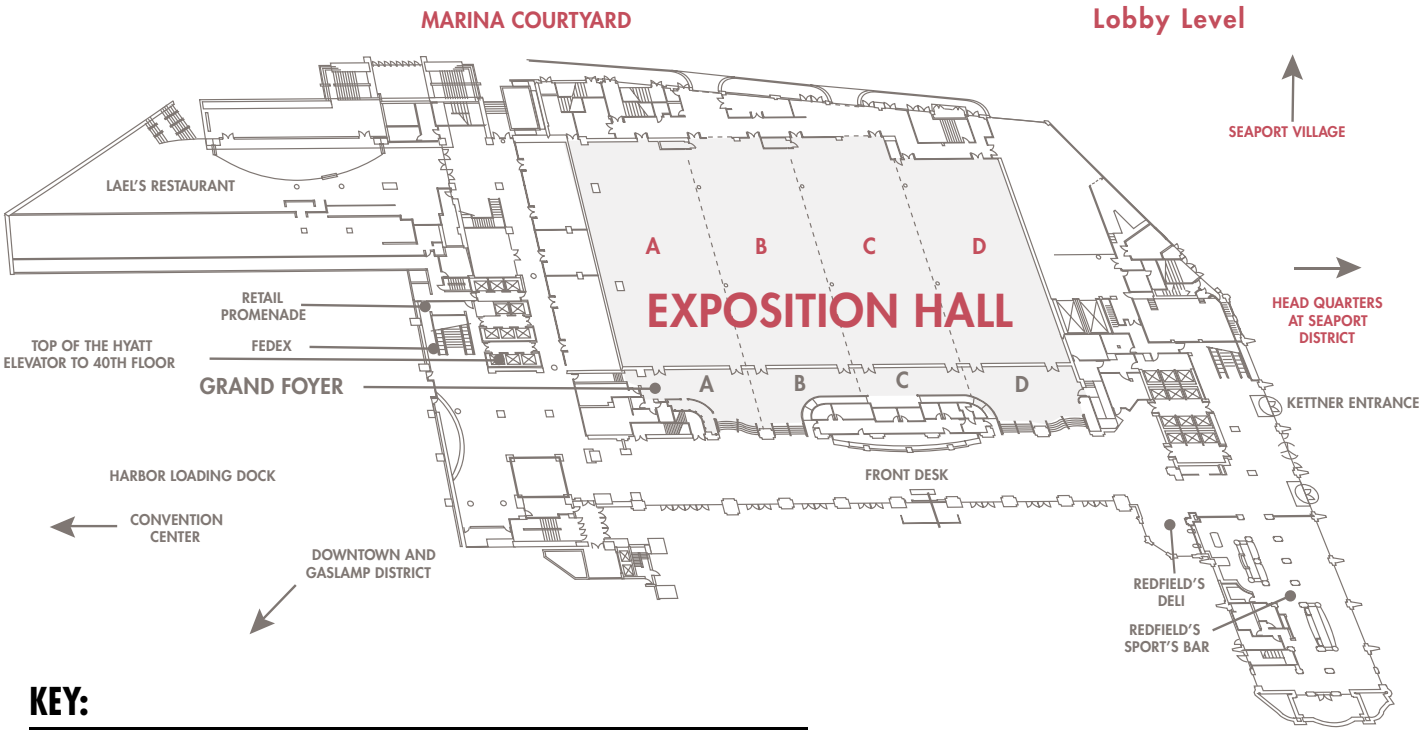


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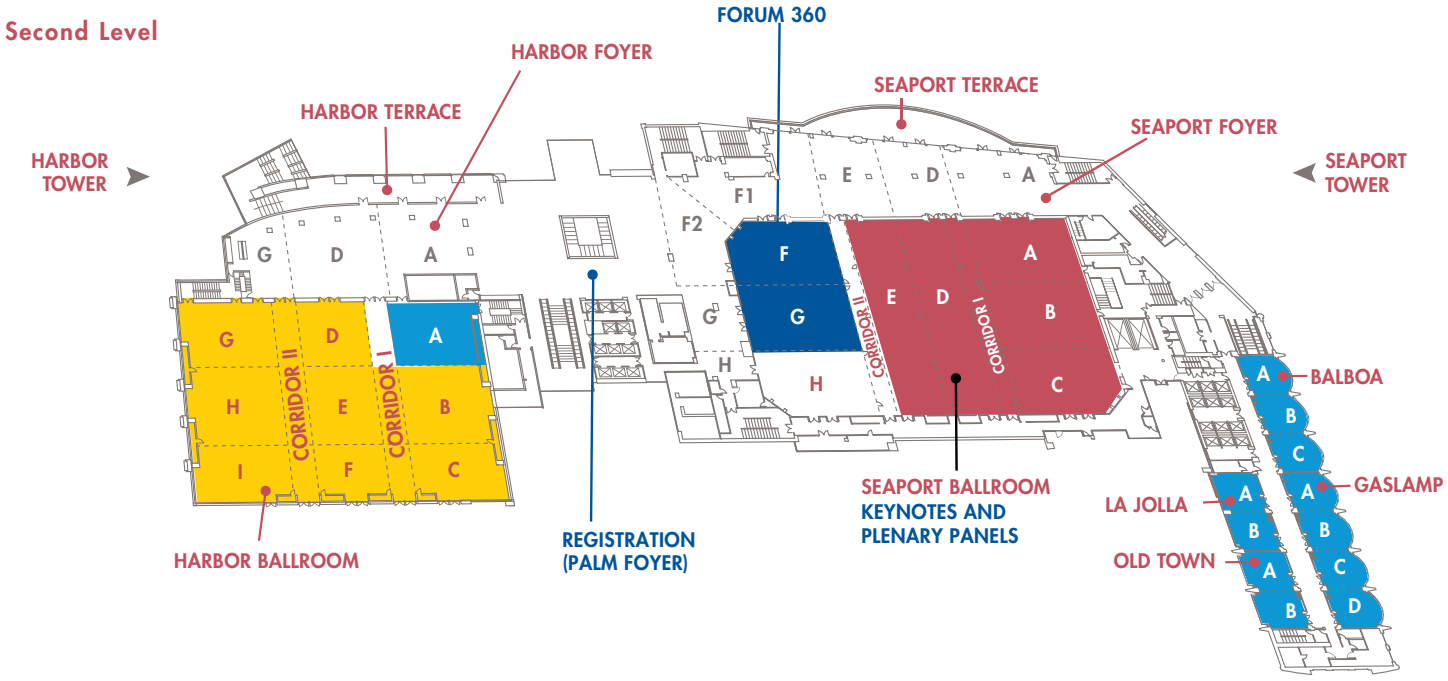

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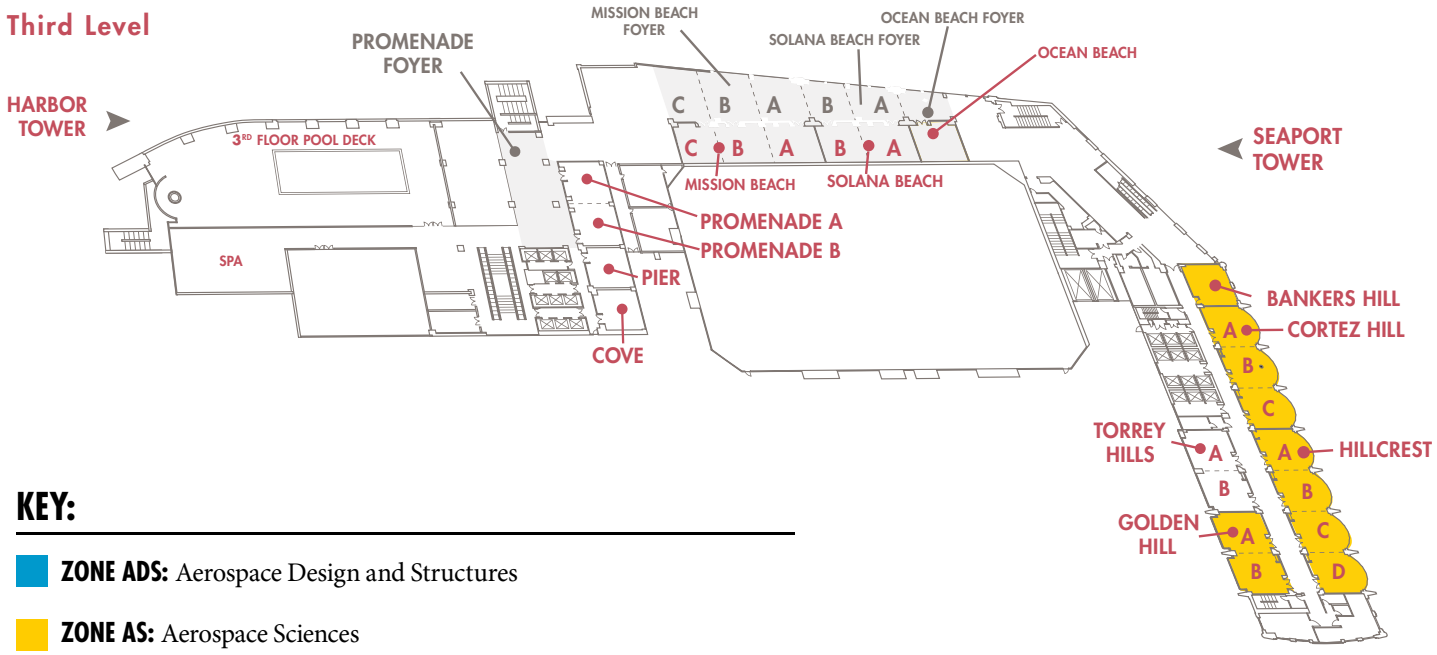


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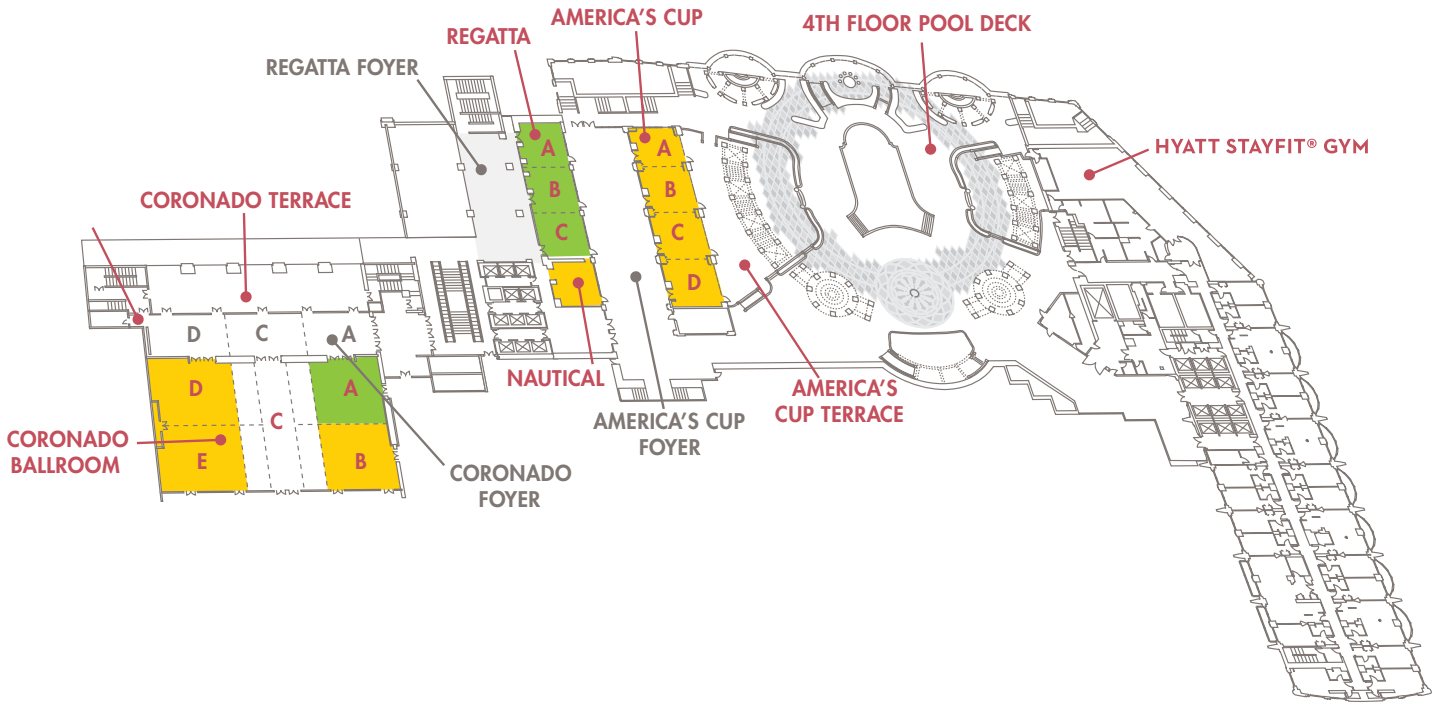
## Fourth Level



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