

26th AIAA International Space Planes and Hypersonic Systems and Technologies Conference

January 6-10, 2025
Hyatt Regency Orlando
Orlando, Florida, USA

Synopsis

The 26th AIAA International Space Planes and Hypersonic Systems and Technologies Conference, co-located in 2025 with the AIAA Science and Technology (SciTech) Forum and Exposition, will provide a forum for discussion and exchange of information for attendees from across the globe about leading-edge research and development activities associated with space planes and hypersonic atmospheric flight vehicles and the technologies underpinning these capabilities. Presentations will be provided on national programs from North America, South America, Australia, Europe, and Asia and multiple opportunities for international collaboration will be discussed. Technical paper topics include planned and ongoing space plane and hypersonic vehicle programs, advanced launch vehicle and hypersonic atmospheric flight vehicle concepts, commercial space tourism concepts, ground and flight testing techniques, results, and lessons learned, reentry vehicle systems and technologies, aerodynamics and aerothermodynamics of space planes and hypersonic vehicles, guidance and control systems, rocket, ramjet, scramjet, and other advanced propulsion systems, including component technologies (e.g., inlets, combustion systems, fuel injection concepts, ignition and flameholding concepts, nozzles), high-temperature materials, hot structures and thermal protection systems, health monitoring and management technologies, and more. Special panel sessions will be organized around relevant topics of strong global interest.

Technical Committee Representative

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Technical Topics

Technical papers are solicited in the following topic areas:

1. Missions and Vehicles addressing:
 - Mission planning and real-time adaptation and optimization
 - Planned and ongoing space plane and hypersonic vehicle programs and approaches
 - Advanced launch vehicles and hypersonic atmospheric flight vehicles
 - Reentry vehicle systems and technologies
 - Overall vehicle system performance and optimization

2. Operational Systems Aspects addressing:
 - Benefits and practicality of hypersonic civil transport
 - Economic and market analysis
 - Environmental effects including chemical pollution, noise, and sonic boom
 - Regulatory, certification, operational, health and safety issues
3. Thermal Management Systems for Vehicles and all Subsystems addressing:
 - Advanced concepts
 - System and component performance, dynamics and active or passive control
 - Trajectory adjustment and optimization
 - System and component development and manufacturing
 - Thermal protection systems, coatings and ablative systems
 - Thermal protection of non-operating propulsion systems (cocooning)
4. Propulsion Systems including and addressing:
 - Rockets, ejector-ramjets, ramjets, dual mode ramjets, scramjets
 - Rocket and turbine based combined cycles
 - Detonation engines, electric propulsion, and other advanced propulsion systems
 - Advanced cycles and concepts
 - System performance, dynamics and control
 - System development and manufacturing
 - Airframe interaction and integration
5. Propulsion Components addressing:
 - Compression components including forebodies, intakes, and compressors
 - Air cooling/collection devices
 - Injectors, combustors, isolators, nozzles and afterbodies
 - Propellant supply systems
 - Performance enhancement concepts, e.g. plasma assisted techniques and advanced nozzles
 - Component performance, dynamics and control
 - Component development and manufacturing
 - Conventional and alternative fuels, additives, catalysis
6. Guidance and Control Systems addressing:
 - Flight mechanics, guidance and control systems for vehicles, subsystems, and payloads
 - Routing, navigation, trajectory optimization, and operations research
 - Health monitoring sensors, actuators, controllers and algorithms
 - System and component performance, dynamics and control

7. Materials and Structures for Vehicles and all Subsystems addressing:
 - Basic materials science and properties
 - Metallic and composite materials for hot and cooled structures
 - Thermal protection systems
 - Active/functional materials
 - Quality control, damage tolerance, structural health monitoring, and survivability
 - Materials manufacturing and processing

8. Test and Evaluation addressing:
 - Ground test facilities, flight test operations, and simulations
 - Diagnostics and data systems
 - Scale limitations and facility effects
 - Test methodology, validation and verification

9. Computational Methods addressing:
 - Advanced computational techniques, FVM, FEM, Cartesian, Overset
 - Thermo-chemically reacting flows
 - Rarefied flows, DSMC methods
 - All-speed regimes codes
 - Turbulence modeling, RANS, DES, LES, etc.
 - Wall catalysis and ablation
 - Magneto-hydrodynamic effects
 - Radiation cooling effects
 - CFD mesh control methods for structured and unstructured grids
 - Hypersonic vehicles design optimization
 - Code validation and verification
 - Facility modeling and simulation

10. Hypersonic Fundamentals and History addressing:
 - Experimental and analytical studies
 - Aero-thermodynamics, gas physics and chemistry
 - Radiation physics and fluid-structure interactions
 - Historical aspects, analyses, assessments and lessons learned