

Ashok Kumar Ghosh

Ph.D. | P.E. | Fulbright Specialist

Associate Professor, Mechanical Engineering | New Mexico Institute of Mining and Technology

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EDUCATION

Ph.D. in Engineering	1993
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Indian Institute of Technology (IIT) Kharagpur, India — Laminated Composite Plates, Higher Order Shear Deformation Theory

M.S. in Structural Engineering	1985
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Washington State University, Pullman, WA — Buckling of Cylindrical Shells

B.Tech. with Honors in Civil Engineering	1983
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Indian Institute of Technology (IIT) Kharagpur, India

ACADEMIC POSITIONS

Associate Professor, Mechanical Engineering (with Solid Mechanics specialization)	2009 – Present
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New Mexico Institute of Mining and Technology (NMT), Socorro, NM

Assistant Professor, Mechanical Engineering	2004 – 2009
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New Mexico Institute of Mining and Technology, Socorro, NM

Associate Professor, Civil Engineering	1997 – 2001
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Indian Institute of Technology Kharagpur, India

Visiting / Adjunct Faculty	1994 – 2004
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Southern Illinois University (1994–96), University of New Mexico (2001–03), IIT Kharagpur (1987–94)

TEACHING EXPERIENCE & PHILOSOPHY

Over 30 years of undergraduate and graduate teaching spanning mechanical engineering, composites, spacecraft engineering, and engineering economics. Courses taught at NMT include:

- MENG 451: Design of Machine Elements (capstone course, taught 9+ times)
- ES 3016: Engineering Economics
- ES 3089: Spacecraft Engineering (co-taught)
- MENG 5085: Graduate-Faculty Seminar (co-taught)
- Composite Structures; Basic Thermodynamics; Structural Analysis; Statics & Dynamics

Teaching philosophy: Challenges students through personalized learning, diagnostic assessment, hands-on projects, and group collaboration. Recognized for engaging, warm classroom environment — "speaking to students, not at them" (student testimony, Spring 2023). Implemented oral exams, MATLAB-based optimization exercises, and gear-box experiments to bridge theory and practice.

Fulbright Specialist — Engineering Economics & Entrepreneurship

Summer 2018

BITS Pilani, K.K. Birla Campus, Goa, India

RESEARCH EXPERTISE & FOCUS AREAS

20+ years of pioneering research on Fluid-Filled Porous Laminated Composite (FFPLC) structures inspired by human skull architecture. Core areas:

- Bio-inspired multifunctional composites: radiation shielding, MMOD protection, thermal management, acoustic isolation
- Additive manufacturing of biomimetic cellular structures (3D-printed capillary networks)
- Zero-gravity fluid transport via surface tension (microgravity validation at NASA Glenn drop tower)
- Laminated composite plate theory, finite element analysis, experimental mechanics
- Forward osmosis desalination; water purification technologies
- CubeSat / small spacecraft structural design
- ASTM standards development for Fluid-Filled Porous Composite Structures (invited, 2025)

CURRENT SPONSORED RESEARCH

NASA EPSCoR FY2025 — AQUASHIELD (Science PI) 2025 – 2028 | \$750,000

Biomimetic FFPLC system integrating water storage, radiation shielding, MMOD protection & thermal management for space habitats. Multi-institution: NMT, UNM, UIUC; Partners: NASA Glenn, Langley, White Sands, AFRL, Sandia, Redwire Space.

DoD — Space Plasma / CubeSat Project (Co-PI)2025 – 2028 | \$957,704 + \$650K cost-share

6U CubeSat for ionospheric tomography; New Mexico Tech Small Spacecraft Laboratory.

NASA R3 — Flexural Analysis of FFPLC (PI) 2024 – 2025 | \$100,000

Constitutive relations for fluid-filled sandwich composites; perfect score (100%) from all three reviewers.

NASA/NMSGC Research Initiation Grant — Biomimetic Heat Pipe (PI) 2024 – 2025 | \$50,000

Advanced heat rejection technology for deep-space flight radiators.

RESEARCH METRICS & SCHOLARLY OUTPUT

88+	484	11	5+3(filed)
Total Publications	Non-self Citations	h-index	Patents (US, Indian, PCT)

Publications include 25 peer-reviewed journals (Computers & Structures, Experimental Mechanics, Finite Elements in Analysis & Design, Nuclear Technology, J. Thermophysics & Heat Transfer, Applied Composite Materials), 42 conference papers, 4 books/book chapters, and 3 magazine articles including AIAA Aerospace America Year-in-Review 2025.

Selected patents: Biomimetic Water Storage & Transport System for Low/Zero Gravity (Non-Provisional + PCT, 2025); Energy Attenuation Structure (US #7,947,364, 2011); Forward Osmosis Desalination (US #9,827,533 & #9,370,747).

GRADUATE STUDENT MENTORING

Primary thesis supervisor for 9 graduated MS students and ongoing advisor for 4 PhD/MS students. Key outcomes:

- Gabriel Maestas (PhD candidate, ongoing) — NASA R3 proposal co-winner (perfect 100% review score); Roy G. Post Foundation Scholarship (2023); publication in Applied Composite Materials (2026)

- Owen Telford (MS, 2023) — Biomimetic heat pipe research; journal publication in AIAA J. of Thermophysics & Heat Transfer; now Nuclear Engineer at Puget Sound Naval Shipyard
- Nicholas Hutt (MS, 2025) — Fluid-filled cellular composite compression; presented at TFEC-2026
- Timothy Amevor (MS, ongoing) — Nanofluid heat pipe optimization; presented at TFEC-2026
- Ryan Flynn (ME, 2025) — NMSGC Graduate Research Fellowship Award, 2024
- Additional graduated advisees: Naitram Birbahadur, Hilda Asmpo, Gedion Sarpong, Jason Mathews, Sidharth Arun Kumar, Leroy Garley — spanning composites, desalination, and biomimetic structures

SELECTED HONORS & RECOGNITION

- Engineer of the Year 2019 — NM Society of Professional Engineers / NSPE Albuquerque Chapter (first recipient from NMT)
- AIAA Aerospace America Year-in-Review 2025 — Featured for AQUASHIELD testing innovation
- Invited to draft ASTM Test Method Standards for Fluid-Filled Porous Composites (ASTM D30.10), 2025
- US Delegation, ISO TC 261/ASTM F42 Meeting on Additive Manufacturing, Manila, Philippines, 2025
- AFRL Summer Faculty Fellow — 2022, 2023, 2024, 2025 (Directed Energy, Kirtland AFB)
- DOE Visiting Faculty, Los Alamos National Laboratory — Summers 2015, 2016, 2017
- New Mexico State Entrepreneurial Pitch Contest Award, 2024
- Chair, ASES SOLAR 2022 National Conference (grew membership from 4,605 to 13,473 in one year)
- Fulbright Specialist — Teaching Engineering Economics & Entrepreneurship, BITS Pilani, India, 2018

PROFESSIONAL SERVICE & AFFILIATIONS

- Member: AIAA (involved with Materials TC, Small Satellite TC), ASME, ASTM D30, ASFE, SEM, NMSPE, NMSEA
- Co-Chaired AIAA SciTech 2026 Session #21: Microstructure Characterization and Modeling
- Lead Editor — ASES SOLAR 2022 Proceedings, Springer Nature (9,911 accesses)
- President, New Mexico Solar Energy Association; Past President, NM Society of Professional Engineers
- NMT Senate: Chair, Budget & Research Committee; Chair, Regent's Faculty Committee
- Tenure committee service for 8 NMT faculty
- Organized NMT's first interdisciplinary student debate competition (2018); featured in NSPE PE Magazine.

Yu-Lin Shen

Department of Mechanical Engineering

University of New Mexico

Tel: 505-277-6286 E-mail: shenyl@unm.edu

Web: <http://www.unm.edu/~shenyl>

Education

Ph.D. Engineering (Materials Science Group)

Brown University Providence, RI May 1994

M.S. Applied Mathematics (Concentration: Solid Mechanics)

Brown University Providence, RI Dec. 1992

M.S. Materials Science and Engineering

National Tsing Hua University Hsinchu, Taiwan June 1988

B.S. Materials Science and Engineering

National Tsing Hua University Hsinchu, Taiwan June 1986

Work Experience

Professor July 2006 – present

Department of Mechanical Engineering, University of New Mexico

(Department Chair, AY2010-2011, AY2016-2025)

Associate Professor July 2001 – June 2006

Department of Mechanical Engineering, University of New Mexico

Assistant Professor August 1996 - June 2001

Department of Mechanical Engineering, University of New Mexico

Post-doctoral Research Associate June 1994 - July 1996

Department of Materials Science and Engineering, Massachusetts Institute of Technology

Selected Honors and Awards

Fellow, ASME (Elected 2005)

World's Top 2% Most Influential Scientists List (Career Impact) by Elsevier/Stanford University, 2021-present (<https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw>)

Top 100 Materials Science Papers in 2020, Scientific Reports - "Instabilities of Thin Films on a Compliant Substrate: Direct Numerical Simulations from Surface Wrinkling to Global Buckling," S. Nikraves, D. Ryu, Y.-L. Shen, 10, 5728 (2020).

PNM Chair in Renewable Energy Research (since 2019)

Courses Taught (at UNM)

ME260L Mechanical Engineering Design II

ME360L Mechanical Engineering Design III

ME370L Engineering Materials Science

ME306 Dynamics

ME401/501 CE501 Advanced Mechanics of Materials

ME471/571 Advanced Materials Science

ME472/572 Aerospace Structures and Materials

ME512 Continuum Mechanics

ME540 Elasticity

ME542 Deformation Analysis & Modeling

ME462 Special Topic: Materials Selection in Mechanical Design

ME462/562 Special Topic: Mechanical Behavior of Materials

ME561 Special Topic: Inelastic Deformation

ME561 Special Topic: Nanomechanics of Materials

Publications: Books

1. Y.-L. Shen, Constrained Deformation of Materials – Devices, Heterogeneous Structures and Thermo-Mechanical Modeling, Springer, New York, 2010 (ISBN: 978-1-4419-6311-6).
2. T. A. Khraishi and Y.-L. Shen, Introductory Continuum Mechanics – With Applications to Elasticity, Cognella, San Diego, 2012 (ISBN: 978-1-60927-105-3).

Publications: Refereed Journal Articles since 2021 (Total journal articles: 164, Citations: 7485, H-Index: 44, according to Google Scholar Citations)

1. Ushnik Ghosh and Yu-Lin Shen
“Effective Thermo-mechanical Properties and Deformation Characteristics of Through-Glass-Via (TGV) Structures in Microelectronic Packaging”
Microelectronics Reliability, **178**, 116022 (2026).
2. Garrett Rose and Yu-Lin Shen
“Effect of deposition rate on microstructure and mechanical properties of 17-4 PH stainless steel fabricated by laser engineered net shaping”
Materials Research Express, **13**, 076501 (2026).
3. Yu-Lin Shen and Kasandra Escarcega Herrera
“Shear Band Formation in Thin-Film Multilayer Columns Under Compressive Loading: A Mechanistic Study”
Materials, **18**, 4215 (2025).
4. Md Al Rifat Anan, Donghyeon Ryu and Yu-Lin Shen
“Wrinkle Formation in Cylindrical Thin Film–Compliant Core Structures: Numerical Simulations and Effects of Inelastic Deformation”
Advances in Mechanical Engineering, **17**, 16878132251342041 (2025).
5. Luo Li, Tariq Khraishi and Yu-Lin Shen
“Indentation and Hardness of Materials: An Inherently Multiscale-Dependent Problem”
Metals, **15**, 265 (2025).
6. Siavash Nikraves and Yu-Lin Shen
“Wrinkle, Fold, and Ridge Patterns of Thin Films Attached to a Compliant Substrate: Direct Numerical Simulations Involving Plastic Yielding”
Thin-Walled Structures, **198**, 111649 (2024).
7. Siavash Nikraves and Yu-Lin Shen
“Plasticity-Mediated Deformation Instabilities in Thin Film-Compliant Substrate Systems: Direct Three-Dimensional Simulations”
Journal of Materials Science, **59**, 4882-4893 (2024).
8. Yu-Lin Shen and Garrett Rose
“Combined effects of pores and cracks on the effective thermal conductivity of materials: a numerical study”
Journal of Materials Science: Materials in Engineering, **19**, 25 (2024).
9. Yi-Jui Yeh, Jinn P. Chu, Jhen-De You, Ting-Hao Chang, Jr Rong Liou, Wei-Hung Chiang, Pakman Yiu, Chun-Hway Hsueh, Yu-Lin Shen, and Kuo-Lun Tung

“Tunable Nanostructured Stainless-Steel Coating for High-Selective and High-Permeable Separation Membranes for Oil/Water Emulsions”

npj Clean Water, **6**, 17 (2023).

10. Rubel C. Das and Yu-Lin Shen

“Analysis of wind farms under different yaw angles and wind speeds”

Energies, **16**, 4953 (2023).

11. Luo Li, Tariq Khraishi and Yu-Lin Shen

“Investigation of the Effect of Indentation Spacing, Edge Distance and Specimen Thickness on the Measurement of Hardness”

Journal of Mechanical Science and Technology, **37**, 687-696 (2023).

12. Mohammed Jaradat, Jorge Loredó Duran, Daniel Heras Murcia, Leah Buechley, Yu-Lin Shen, Christos Christodoulou, Mahmoud Reda Taha

“Cognizant FRP Composites Incorporating Seamlessly Integrated Sensing and Computing Circuitry”

Polymers, **15**, 4401 (2023).

13. Siavash Nikraves, Donghyeon Ryu and Yu-Lin Shen

“Surface Wrinkling vs. Global Buckling Instabilities in Thin Film-Substrate Systems under Biaxial Loading: Direct Three-Dimensional Numerical Simulations”

Advanced Theory and Simulations, **5**, 2200183 (2022).

14. Jafar Ghorbani, Pratik Koirala, Yu-Lin Shen and Mehran Tehrani

“Eliminating Voids and Reducing Mechanical Anisotropy in Fused Filament Fabrication Parts by Adjusting the Filament Extrusion Rate”

Journal of Manufacturing Processes, **80**, 651-658 (2022).

15. Yu-Lin Shen, Mohammad G. Abdo and Isabella J. Van Rooyen

“Thermal Conductivity of Crack-Containing Media: A Numerical Study”

Journal of Composite Materials, **56**, 2495-2508 (2022).

16. Yu-Lin Shen, Mohammad G. Abdo and Isabella J. Van Rooyen

“Numerical Study of Effective Thermal Conductivity for Periodic Closed-Cell Porous Media”

Transports in Porous Media, **143**, 245-269 (2022).

17. Siavash Nikraves and Yu-Lin Shen

“Evolution of Thin-Film Wrinkle Patterns on a Soft Substrate: Direct Simulations and the Effects of Deformation History”

Nanomaterials, **12**, 3505 (2022).

18. Yu-Lin Shen

“On the Viscoelastic Drift Behavior during Nanoindentation”

Frontiers in Materials, **9**, 900088 (2022).

19. Siavash Nikraves, Donghyeon Ryu and Yu-Lin Shen
“Direct Numerical Simulations of Three-Dimensional Surface Instability Patterns in Thin Film-Compliant Substrate Structures”

Scientific Reports, **11**, 16449 (2021).

20. Yu-Lin Shen and Nima Fathi
“Numerical Study of Elastic-Plastic Behavior of Pore-Containing Materials: Effects of Pore Arrangement”

International Journal of Theoretical and Applied Multiscale Mechanics, **3**, 262-286 (2021).

Invited Talks Since 2021 (total invited talks 68)

1. Yu-Lin Shen
“Evolution of Wrinkle Patterns on Soft Substrate-Attached Thin Films– Direct Numerical Predictions”

International Symposium on Precision Engineering 2021, virtual meeting, November 12-14, 2021.

2. Yu-Lin Shen
“Deformation, Surface Patterns, and their Numerical Prediction”

Keynote talk, TACT 2021 International Thin Films Conference, virtual meeting, November 15-18, 2021.

3. Yu-Lin Shen
“Predicting Effective Thermal Conductivity and Mechanical Behavior of Porous Structures”

Plenary Speaker, International Symposium on Precision Engineering 2022, Nantou, Taiwan, November 11-13, 2022.

4. Yu-Lin Shen
“Prediction of Wrinkle Patterns in Thin Film-Compliant Substrate Systems: Direct Numerical Simulations”

Keynote for symposium Advanced Materials: Computational Analysis of Properties and Performance, World Congress on Computational Mechanics (WCCM 2024), Vancouver, Canada, July 21-26, 2024.

5. Md Al Rifat Anan and Yu-Lin Shen
“Compression vs. Tension-Induced Wrinkle Formation on Thin Film/Compliant Substrate Structures: A Numerical Simulation Study”

TACT 2025 International Thin Film Conference, Taipei, Taiwan, October 26-29, 2025.

Selected Professional Service

Associate Editor, *Journal of Mechanics* (ISSN 1727-7191, Oxford Academic), 2004-present.

Editorial Board Member, *Materials Science and Engineering A* (ISSN 0921-5093, Elsevier), 2012-present.

Journal manuscript reviewer for 55 journals.