Frank J. Shih, Ph.D.

Associate Professor of Mechanical Engineering

College of Science & Engineering, Seattle University
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RESEARCH INTERESTS

Analytical and experimental solid and structural mechanics. Impact damage and failure issues in composite materials. Nondestructive evaluation and wave mechanics.

ACADEMIC APPOINTMENTS

Associate Professor

Department of Mechanical Engineering, Seattle University 9/2009 – Present
as an Assistant Professor 9/2003 – 6/2009

Visiting Associate Professor

Department of Bioengineering, UCLA 9/2010 – 6/2011

Lecturer / Adjunct Faculty

Department of Mechanical & Aerospace Engineering, UCLA 9/2002 – 6/2003
Department of Chemical Engineering & Materials Science, UC Irvine 4/2003 – 6/2003

PROFESSIONAL EXPERIENCES

Visiting Professor/Visiting Researcher, *Bioengineering Department, UCLA*, Los Angeles, CA 9/2010 – 9/2011
Developed an accurate jet-impingement system for measuring cell adhesion strength on titanium substrates. Researched pathogen detection techniques with electrochemistry. Provided guidance on instrumentation, machine design, and specimen preparation to student researchers. (Host: Prof. Benjamin M. Wu)

Welliver Faculty Fellow, *The Boeing Company*, St. Louis, MO & Seattle, WA 6/2010 – 8/2010
Learned Boeing engineering practices and identified areas for improvements, particularly in Test & Evaluation. Shadowed teams working on the 747-8 and 787 testing programs. Explored areas of mutual interest in engineering research and education. (Mentor: Norm Englund, Associate Technical Fellow)

Associate Staff Scientist, *Lasson Technologies, Inc.*, Culver City, CA 2/2000 - 2/2001
Developed prototype laser-based ultrasonic diagnostic systems for characterizing material properties. Conducted R&D in nondestructive evaluation for automotive, steel, energy, and semiconductor industry clients. (Supervisor: Dr. Marvin B. Klein)

Consultant, *Rockwell Science Center*, Thousand Oaks, CA 2/1998 - 1/2000
Developed a control and actuation system for vibration isolation in an optical instrument. Developed prototype instrumentation and applied novel techniques to inspect metallic and composite aerospace structures. (Supervisor: Dr. Andrew D. W. McKie)

EDUCATION

Ph.D.,	Mechanical Engineering (Advisor: Prof. Ajit K. Mal) *Major Field: Solid & Structural Mechanics*	UCLA	2002
M.S.,	Mechanical Engineering	UCLA	1997
M.S.,	Materials Science & Engineering (Advisor: Prof. Jenn-Ming Yang)	UCLA	1995
B.S.,	Mechanical Engineering (Advisor: Prof. Enrique J. Lavernia)	UC Irvine	1993

HONORS

2014 Spirit of Community Faculty Award
2010 Boeing Welliver Faculty Fellowship
2003 Best Paper Award in Nondestructive Evaluation, SPIE
Tau Beta Pi – The Engineering Honor Society
Sigma Xi – The Scientific Research Society

PUBLICATIONS

(undergraduate student researchers underlined)

Patents

U.S. Patent No. 6,496,268 Dec. 17, 2002, Laser-Based Glass Thickness Measurement System and Method, A. D. W. McKie, M. B. Klein, B. Pouet, and F. J. Shih, inventors.

Book Chapters

S. Banerjee, F. Ricci, F. Shih, and A. Mal, "Health Monitoring of Composite Structures Using Ultrasonic Guided Waves," in *Advanced Ultrasonic Methods for Material and Structure Inspection*, T. Kundu ed., Wiley-ISTE Publishing, pp 43-88, 2007 (ISBN: 978-1-905209-69-9)

Peer Reviewed Conference Proceedings (past 5 years)

1. O. F. Van Valkenburgh, T. C. Ekstrom, E. M. Goodman, C. C. Leborte, M. K. Haaland, N. K. Yasuda, and F. J. Shih, 2019, "Energy Absorption Characteristics of a Nested Curved Column Reinforced Elastomer Composite," *Proc. of the 2016 ASME IMECE*, Salt Lake City, UT, doi:10.1115/IMECE2019-12096
2. D. J. Traina, T. C. Ekstrom, O. F. Van Valkenburgh, J.-P. R. Wallis, D. S. Schulman, E. R. Mather, N. K. Yasuda, and F. J. Shih, 2018, "A Three-Dimensional Nested Reinforcing Mesh in Elastomers for Crashworthy Applications," *Proc. of the 2016 ASME IMECE*, Pittsburgh, PA, doi:10.1115/IMECE2018-88471
3. N. K. Yasuda, D. S. Schulman, D. J. Traina, E. R. Mather, K. V. Lane, M. E. Lo, K. D. Weaver, F. J. Shih, "Investigation of Energy Absorption Characteristic of Ceramic Fiber Reinforced Elastomer Composites." Proc. of the 2017 ASME IMECE, Tampa, FL, doi:10.1115/IMECE2017-72103
2. K. V. Lane, N. K. Yasuda, M. E. Lo, E. R. Mather, F. J. Shih, "Experimental Characterization of Low Velocity Impact Energy Dissipation in Sandwich Composites with Porous Cores with Tailored Structure and Morphology." *Proc. of the 2016 ASME IMECE*, Pheonix, AZ, doi:10.1115/IMECE2016-67901
3. A. M. Bever, P. J. Brown, K. V. Lane, B. L. Levy-Wendt, N. K. Yasuda, Y.-L. Han, F. J. Shih, "Characterization of a Fast Responding Composite Thermal Bimorph Film Actuator Based on Carbon Nanotube Sheets." *Proc. of the 2015 ASME IMECE*, Houston, TX, doi:10.1115/IMECE2015-52576

Peer Reviewed Journal Articles

1. F. J. Shih, G. H. Bratzel, A. D. Enke, C. Pang, J. L. Nicoln, J. H. Lee, A. E. Beach, "Geometric Dependence of Interlaminar Tensile Strength in L-Shaped Composite Specimens," *Journal of Advanced Materials*, Vol 42, pp. 41-48, 2010
2. A. Mal, F. Ricci, S. Banerjee and F. Shih, "A Conceptual Structural Health Monitoring System Based on Wave Propagation and Modal Data," *Structural Health Monitoring*, Vol 4, pp. 283-293, 2005
3. A. Mal, F. J. Shih, and W. H. Prosser, "Lamb Waves from Impact Damage in Composite Plates," *Instrumentation, Measurements, and Metrology, Special Issue on Ultrasonic Methods for Material Characterizatio*n, Vol 3, pp. 11-37, 2003
4 T. Ogawa, S. Ozawa, J.-H. Shih, K. H. Ryu, C. Sukotjo, J. M. Yang, and I. Nishimura, "Biomechanical Evaluation of Osseous Implants Having Different Surface Topographies in Rats," *Journal of Dental Research*, Vol. 79, pp. 1857-63, 2000
5. J.-H. Shih, A. K. Mal, and M. Vemuri, "Plate Wave Characterization of Stiffness Degradation in Composites during Fatigue," *Research in Nondestructive Evaluation*, Vol 10, pp. 147-62, 1998
6. J. Wolfenstine and J.-H. Shih, "Creep Behavior and Dislocation Substructure Evolution in the KI-KBr System," *Journal of Materials Science*, Vol 29, pp. 6199-206, 1994
7. J.-H. Shih, J.-Y. Wu, and E. J. Lavernia, "The Coarsening Behavior of Primary Si in Melt-Spun Al-22wt% Si Alloy," *Scripta Metallurgica et Materialia*, Vol 29, pp 31-6, 1993

SERVICES *(notable, past 5 years)*

University

- President – Academic Assembly 6/2017 – Present
  as a member 6/2015 – Present
- Member – Provost Council 9/2017 – Present
- Member – Academic Affairs Operation Review (AAOR) Committee 9/2016 – 6/2017
- Member – Academic Policy Review Committee 9/2016 – Present
- Task Force on Diversity and Inclusive Excellence 2014 – 2015
  - Member – Campus Climate Study Working Group
  - Member – Campus Climate Assessment Ambassador
  - Member – SU as a Work Place Subcommittee

College of Science & Engineering

- Member – College Personnel Committee 9/2016 – 6/2019
- Advisor/Director – Bannan Scholars Program 9/2011 – 6/2019

Department of Mechanical Engineering

- Quarterly Academic Advising ~ 20 Mechanical Engineering Students
- ABET Review Visitation Support – Documentation, laboratory tour guide

Professional

- Chair, Soft Material and Polymers Technical Committee, Materials Division, ASME 2016 – 2018
- ASME IMECE Conference Organizer: Technical Topic Organizer, Session Organizer, Chair

VOLUNTEER & OUTREACH ACTIVITIES

5th Grade Afterschool STEM (STEAM) Program 9/2011 – Present

Developed science and engineering modules, led college student mentors, and delivered weekly afterschool science program contents to 5th grade students at Bailey Gatzert Elementary School as a part of Seattle University Youth Initiative. Raise the needed funds for the program from various sources. Work with Elementary School teachers on improving both capability and interest in science and engineering.

FIRST Robotics Program Volunteer 2008 – 2010

- Judge, Microsoft Seattle Regional FIRST Robotics Competition (FRC)
  - 2010 Key Arena, Seattle WA 2010
  - 2009 Key Arena, Seattle, WA 2009
  - 2008 Tacoma Convention Center, Tacoma, WA 2008
- Judge/Referee, WA State FIRST Lego League (FLL) and FIRST Tech Challenge (FTC)
  - 2009 Bellevue High School, Bellevue, WA 2010

Diversity & Underprivileged Outreach

UCLA Center for Excellence in Engineering and Diversity (CEED) 1996 – 2003

MATI Short Course Instructor: trained high school science teachers 2003

SMARTS Instructor:

Taught 9th grade students robotics using LEGO Mindstorm Sum 2003

Mentored minority youth in science projects Sum 1996, 1998, 1999, and 2002

BREES Instructor:

Taught in a underrepresented engineering student retention program Sum 2001

Weekly tutoring at Prairie Vista Middle School (97% Minority), Hawthorne, CA Jan – Jun 2003

Camp Footprints, Yucaipa, CA

Camp counselor for children with developmental disabilities Sum 1997, 1998, and 1999