

CURRICULUM VITAE

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|  | <p><i>M.-H. Herman Shen</i> Professor & ASME Fellow Department of Mechanical and Aerospace Engineering The Ohio State University Peter L. and Clara M. Scott Laboratory 201 West 19th Avenue Suite E510 Columbus, OH 43210-1142 Mobile: (614) 530-4824; E-mail: shen.1@osu.edu https://mae.osu.edu/labs/tamlab/</p> |
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EDUCATION:

PhD, Aerospace Engineering, University of Michigan, Ann Arbor, MI (1989)
MS, Aerospace Engineering, University of Michigan, Ann Arbor, MI (1986)
ME, Mechanical Engineering, Old Dominion University, Norfolk, VA (1983)
BS, Mechanical Engineering, Tamkang University, Tamsui, Taiwan (1980)

PROFESSIONAL EXPERIENCE:

Associate Chair for Administration (ACA), Department of Mechanical and Aerospace Engineering (MAE), The Ohio State University (2016-2019)

ACA job duties includes:

- Development of MAE Teaching/workload policy and algorithm.
- Development of Teaching load data acquisition and recording system.
- Evaluation and reviewing MAE faculty proposal cost share, and budget, applications.
- Guiding, monitoring, and reviewing MAE P&T processes and final documentation
- Organization of three External Advisory Board meetings (Mechanical, Aerospace, and Nuclear Engineering) and associated activities.

Chair of Graduate Studies Committee, Aerospace Engineering, The Ohio State University (2007-2010, 2014-2016)

Under the guidance of Dr. Shen, the MS and PhD programs renewed efforts towards developing even stronger teaching and research capabilities in the field

of theoretical and experimental aero-propulsion, aero-mechanics/controls, and space. A few select contributions of Dr. Shen are listed below: (1) Development of faculty work load policy and teaching load recording system, (2) Development of research programs with increased sponsorship, (3) Improvement in graduate enrollment, (4) Re-establishment of space research, and (5) Intensified minority graduate student recruitment efforts.

Professor, Mechanical and Aerospace Engineering, The Ohio State University (2001-present)

Associate Professor, Aerospace Engineering, The Ohio State University (1995-2001)

Assistant Professor, Aerospace Engineering, The Ohio State University (1989-1995)

Mechanical Engineer, System Management American Corp., Norfolk, VA (1983-1984)

RESEARCH INTERESTS:

- Energy-based fatigue & thermal-mechanical fatigue failure assessment and lifing technology development for in-service structural components such as gas turbines, wind turbines, aircrafts, power generation equipment, pipelines, and offshore platforms.
- On-line structural damage identification. Structural health management for in-service critical components. Smart materials/Adaptive structures.
- Energy & Power Generation Critical Components Lifing Assessment and Sustainability Technologies.
- Probability-based life/reliability prediction/design methodologies to ensure structural integrity, reliability, and safety.
- Reliability-based robust design optimization.
- Deep learning-based engineering design/analysis, digital twin predictive & proactive maintenance, plant operational optimization, online defect detection and identification.

HONORS:

National Research Council Visiting Senior Scientist, 2005-2006 sabbatical leave, U.S. Air Force Research Labs, Propulsion Directorate, Turbine Division, Wright-Patterson AFB.

Visiting Senior Scientist, 1999, Material & Manufacturing Directorate, U.S. Air Force Research Labs and Air Force Institute of Technology

Visiting scholar, 1999, Visiting Scholar, Institut de Genie Atomique, 1999 Departement de Physique Ecole Polytechnique Federale de Lausanne (EPFL) Lausanne, Switzerland.

Visiting scholar, 1997, Faculty of Engineering, University of Tokyo, Hongo, Tokyo, Japan.

Visiting Associate Professor, 1996-1997, Faculty of Engineering, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong.

Visiting Professor, 2014, Faculty of Engineering, The Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong.

Associate Editor, 2015-2018, ASME Journal of Engineering for Gas Turbines and Power

The Journal of Engineering for Gas Turbines and Power (JEGTP) is the premier journal in research areas of gas and steam turbine technology, nuclear engineering, internal combustion engines, and fossil power generation, and one of the highest ranked research journals in Aerospace and Mechanical Engineering by the Journal Citation Report. The JEGTP is one of the largest journals published by the ASME. Prof. Shen was selected for this position over amount of hundreds of researchers from top research universities, DoE, DoD, Aerospace and Power Generation Industries, and international institutions. The comment from the editor of the journal, Dr. David Wisler, on my contribution to the journal as an associate editor is shown below.

From: David Wisler [<mailto:davewisler@me.com>]

Sent: Wednesday, June 20, 2018 5:18 PM

To: Shen, Herman <shen.1@osu.edu>

Subject: Thank you

Dear Herman,

My term as editor for the ASME Journal of Engineering for Gas Turbines and Power has ended and I want to thank you for your very effective work as an Associate Editor. Your expertise in structures and dynamics, fatigue failure, and life prediction methodology, and your willingness to conduct professional-quality reviews for submitted papers in that technology is the lifeblood of our Journal. Without you, we would have no credible technical standing. Your comments to me after reviewing papers or when I asked you for judgment were excellent and helped me a great deal in writing constructive comments to the authors.

AWARDS:

- ASME Fellow, American Society of Mechanical Engineers, 2002
- OSU College of Engineering Research Award, 2001.
- ALCOA Foundation Research Award, 1995.
- U.S. Air Force Research Initiation Award, 1991.

Ph.D. STUDENTS ADVISED TO COMPLETION AS SOLO ADVISOR:

Dr. Po-Yu Tsou, (Winter 1994), currently employed as a research engineer at Ford Motor Company.

Thesis topic: On-Line Damage Identification and Motion Control of Adaptive Structures: An Intelligent Control Approach.

Prof. David Lanning, Jr, (Spring 1997) currently employed as a full professor at Department of Aerospace Engineering Embry-Riddle Aeronautical University, Prescott, AZ, U.S.A.

Thesis topic: Reliability of Engineering Structures Containing Fatigue Cracks.

Dr. Troy Meink, (Spring 1999), currently employed as a group leader and deputy branch chief at the Structural Component Branch, Space Vehicle Division, Air Force Research Labs, Phillips Labs, Kirtland AFB.

Thesis topic: Warpage Prediction and Reduction of Filament Wound Composite Cylindrical Shells.

Dr. Hsin-Yi Yen, (Summer 2000), currently employed as a manager at the Aero Mechanics Department, GE Aircraft Engines.

Thesis topic: New Analysis and Design Procedures for Ensuring Gas Turbine Blades and Adhesive Bonded Joints Structural Integrity and Durability.

Dr. Tommy George, (Spring 2002), currently employed as a director of the gas turbine engine fatigue facility, AFRL/RZTS WPAFB.

Thesis topic: Development of Methodologies for Ensuring Structural Safety of Gas Turbines and Launch Vehicles.

Dr. Onome Scott-Emuakpor, (Summer 2007) currently employed as a technology lead in Structural Dynamics Division of the Air Force Research Labs, AFRL/RZTS WPAFB. Dr. Onome Scott-Emuakpor, was honored by President Obama with Presidential Early Career Award for Scientists and Engineers. The award is the highest honor bestowed by the US government on science and

engineering professionals in the early stages of their independent research careers.

Thesis topic: Development of A Novel Energy Based Method for Multi-axial Fatigue Strength Assessment.

Dr. SoonYoung Hong, (Fall 2007) currently employed as an engineer at NAVSEA.

Thesis topic: An Effective Data Mining for Structural Damage Identification.

Dr. Wasim Tarar, (Winter 2008) currently employed as an assistant professor, National University of Science and Technology, Pakistan.

Thesis topic: A New Finite Element Procedure for Fatigue Life Prediction and High Strain Rate Assessment of Cold Worked Advanced High Strength Steel.

Dr. Hakan Ozaltun, (Spring 2011) currently employed as a postdoc research fellow, National Idaho National Laboratory, USA.

Thesis topic: An Energy Based Fatigue Lifting Method for In-Service Components and Numerical Assessment of U10Mo Alloy Based Fuel Mini Plates.

Dr. Todd Letcher, (Summer 2012) currently employed as an assistant professor, South Dakota State University.

Thesis topic: Structural Reliability through Robust Design Optimization and Energy-based Fatigue Analysis

Dr. John Wertz, (Spring 2013) currently employed as an aerospace engineer, AFRL, WPAFB.

Thesis topic: Fatigue Lifting Technology and Isothermal Fatigue Life Assessment and Management

Dr. Casey Hollycross, (Spring 2016) currently employed as an aerospace engineer, AFRL, WPAFB.

Thesis topic: A Multiscale Analysis and Extension of an Energy Based Fatigue Life Prediction Method for High, Low, and Combined Cycle Fatigue.

POSTDOCTORAL RESEARCH FELLOW ADVISED:

Dr. Sajedur Akanda, (2013-2016) currently employed as a research fellow, DoE Albany Research Center.

CURRENTLY ADVISING:

Liang Chen, (PhD Autumn 2020)

Thesis topic: Development of a Novel Design Optimization Process by Deep Learning

Dino Celli, (PhD Autumn 2020)

Thesis topic: Development of Energy-based Fatigue Lifting Assessment Framework for Additive Manufacturing Materials

Justin Warner (MS Spring 2021)

Thesis topic: Fatigue-Creep Assessment of Additive Manufacturing Materials

Josh Cardosi (MS Spring 2022)

Thesis topic: A New In-Situ Additive Manufacturing Process Monitoring and Quality Control Approach using Machine Learning Technology

REFERENCED PUBLICATIONS:

Journals:

1. J. Cardosi, **H. Shen**, H. Xiang, J. Groner, & M. Armstrong, "Machine Intelligence for Outcome Predictions of Trauma Patients During Emergency Department Care", arXiv:2009.03873. (first author is Dr. Shen's student).
2. L. Chen and M.-H. H. **Shen**, "Topology Optimization through Differentiable Finite element Solver", arXiv:2009.10072. (first author is Dr. Shen's student)
3. D. Celli, **M.-H. H. Shen**, O. Scott-Emuakpor, C. Holycross, & T. George, "Rapid Characterization of Fatigue Performance with Application to Additive Manufactured Components", ASME IGTI 2020 – 14747, recommend for publication, *ASME Journal of Engineering for Gas Turbines and Power*. (first author is Dr. Shen's student).
4. L. Chen and M.-H. H. **Shen**, Xin Zhang, and Jianghua Gao, 2019, "A Novel Compliance Constrained Mass Optimization Framework for Vehicle Suspension Subframe Structures", SAE International Journal of Vehicle Dynamics, Stability, and NVH, JNVH-2019-0034, Jan. 2020, <https://doi.org/10.4271/10-04-02-0008>. (first author is Dr. Shen's student).
5. S. Rawat and M.H. H. **Shen**, 2019, A Novel Topology Optimization using Conditional Deep Learning, Arxiv: 1901.04859. (first author is Dr. Shen's student)
6. M.-H. H. **Shen** and L. Chen, 2019, A New CGAN Technique for Constrained Topology Design Optimization, Arxiv:1901.07675.

7. D. Celli, **M.-H. H. Shen**, O. Scott-Emuakpor, C. Holycross, & T. George, "Stochastic Fatigue Life Prediction Based on a Reduced Data Set", *ASME Journal of Engineering for Gas Turbines and Power*, Mar 2020, 142(3): 031017 (first author is Dr. Shen's student)
8. S. Rawat S and M.-H. H. **Shen**, "A Novel Topology Design Approach using an Integrated Deep Learning Network Architecture". 2018, Arxiv: 1808.02334,
9. D. Celli, M.-H. H. **Shen**, C. Holycross, O. Scott-Emuakpor, and T. George, 2019, "Measurement of Hysteresis Energy using Digital Image Correlation with Application to Energy Based Fatigue Life Prediction", *ASME Journal of Engineering for Gas Turbines and Power*, Sept. 2019, Vol. 141, 091018-1. (first author is Dr. Shen's student)
10. M.-H. H. **Shen** & A. Akanda, 2017 "Prediction of Non-linear Evolution of Fatigue Damage Accumulation from an Energy-based Model", Vol.139 (7) 072501, *ASME Journal of Engineering for Gas Turbines and Power*.
11. M.-H. H. **Shen** & A. Akanda, 2016, "A Closed Form Energy-Based Framework for Fatigue Life Assessment for Aluminum 6061-T6– Strain Range Approach", *International Journal of Damage Mechanics*". Vol. 25, Issue 5, pp. 661-671.
12. M.-H. H. **Shen** & A. Akanda, 2015, "A Modified Closed Form Energy-Based Framework for Axial Isothermal-Mechanical Fatigue Life Assessment for Aluminum 6061-T6 – Damaging Energy Approach", *ASME Journal of Engineering Materials and Technology*, 137 (2), 021008.
13. M.-H. H. **Shen**, S. Akanda, X. Liu, and P. Wang, 2016, "Fatigue Crack Growth Threshold Determination for Welded Joint Constituents of a Steam Turbine LP Rotor", *Experimental Techniques*, Vol. 40, Issue 4, pp. 1215-1220.
14. M.-H. H. **Shen** & A. Akanda, 2014, "A Closed Form Energy-Based Framework for Fatigue Life Assessment – Damaging Energy Approach", doi:10.1115/1.4029532, *ASME Journal of Engineering Materials and Technology*.
15. M.-H. H. **Shen** & Sajedur Akanda, 2014, "An Energy-Based Framework to Determine the Fatigue Strength and Fatigue Ductility Parameters for LCF/HCF Life Assessment of Turbine Materials", DOI: 10.1115/1.4029204, *ASME Journal of Engineering for Gas Turbine and Powder*.
16. M.-H. H. **Shen**, S. Akanda, X. Liu, and P. Wang, 2014, "Toughness and Ductility of Welded Joints of a Steam Turbine LP Rotor, DOI: 10.1177/105678951 4554922, *International Journal of Damage Mechanics*.

17. D. Ji, M.-H. H. **Shen**, D. Wang, J. Ren, 2014, "Creep-Fatigue Life Prediction and Reliability Analysis of P91 Steel Based on Applied Mechanical Work Density", DOI :10.1007/s11665-014-1261-8. *Journal of Materials Engineering and Performance*, Vol. 24, pp. 194-201. (first author is Dr. Shen's visiting scholar)
18. D. Ji, M.-H. H. **Shen**, S. Yang, and G. Xia, 2014, "Rotor Notch Fillet on Stress and Deformation", *Advanced Materials Research*, Vols. 860-86, pp. 1770-1781. (first author is Dr. Shen's visiting scholar)
19. J. Zhang, W. Li, G. Cheng, X. Chen, H. Wu, and M.-H. H. **Shen**, 2014, "Life Prediction of OLED for Constant-Stress Accelerated Degradation Tests Using Luminance Decaying Model, *Journal of Luminescence*, Vol. 154, October, pp. 491-495. (first author is Dr. Shen's visiting scholar)
20. C. Holycross, M.-H. H. **Shen**, O. Scott-Emuakpor, and T. George, 2014, "Extension of an Energy Based Life Prediction Method to Low and Combined Cycle Fatigue Regimes," DOI: 10.1177/0309324714547608, *Journal of Strain Analysis for Engineering Design*. (first author is Dr. Shen's student)
21. J. Zhang, C. Wang, X. Chen, G. Cheng, Y. Qiu, and M.-H. H. **Shen**, 2014, "Experimental Test and Life Estimation of OLED at Normal Working Stress Based on Luminance Degradation Model", DOI:10.1002/bio.2741, *The Journal of Biological and Chemical Luminescence*. (first author is Dr. Shen's visiting scholar)
22. T. Letcher, J. Wertz, & H. **Shen**, 2013, "A Robust Optimization Technique for Calculating Scaling Coefficients in an Energy-based Fatigue Life Prediction Method", *ASME Journal of Engineering for Gas Turbine and Powder* 135(12), 122502, DOI: 10.1115/1.4025315. (first & second authors are Dr. Shen's students)
23. T. Letcher, M.-H. H. **Shen**, O. Scott-Emuakpor, T. George, & C. Cross, 2013, "Strain Rate and Loading Waveform Effects on an Energy-Based Fatigue Life Prediction for Al6061-T6", *ASME Journal of Engineering for Gas Turbine and Powder* 136 (2), 022502, doi:10.1115/1.4025497. (first author is Dr. Shen's student)
24. J. Wertz, T. C. Holycross, M.-H. H. **Shen**, O. Scott-Emuakpor, T. George, & C. Cross, 2013, "A Comparison of Constitutive Equations for the Energy-Based Lifting Method", *Transaction ASME Journals of Engineering Materials and Technology*, Vol. 135, No. 3, 031008. (first & second authors are Dr. Shen's students)
25. H. Ozaltun, H. **Shen**, P. Medvedev, and S. Miller, 2013, "Computational Evaluation of the Mechanical Response for U10Mo Fuel Mini-Plates

- Subject to Thermal Cycling”, *Journal of Nuclear Engineering and Design*, Vol. 254, pp. 165-178. (first author is Dr. Shen’s student)
26. J. Wertz, T. Letcher, M.-H. H. **Shen**, O. Scott-Emuakpor, T. George, & C. Cross, 2012, "An Energy-Based Axial Isothermal-Mechanical Fatigue Lifting Method", *ASME Journal of Engineering for Gas Turbine and Powder*, Vol. 134, Issue 10, Online August 17, 2012. (first & second authors are Dr. Shen’s students)
27. O. Scott-Emuakpor, T. George, T. Letcher, M.-H. H. **Shen**, and C. Cross, 2012, "Incorporation of a Probabilistic Monotonic Strain Energy", *Journal of Failure Analysis and Prevention*, Vol. 12, Issue 1, p. 109-115.
28. J. Wertz, M.-H. H. **Shen**, O. Scott-Emuakpor, T. George, and C. Cross, 2012, "An Energy-Based Torsional-Shear Lifting Method", *Experimental Mechanics*. Vol. 52, No. 7, Pages 705-715. (first author is Dr. Shen’s student)
29. J. Wertz, M.-H. H. **Shen**, O. Scott-Emuakpor, T. George, & C. Cross, 2012, "An Energy-Based Isothermal-Mechanical Lifting Method", *ASME Journal of Engineering for Gas Turbines and Power*, Vol. 134, issue 2, 024502. (first author is Dr. Shen’s student)
30. O. Scott-Emuakpor, T. George, C. Cross, John Wertz, and M.-H. H. **Shen**, 2011, "A New Distortion Energy Based Equivalent Stress for Multiaxial Fatigue Life Prediction", *International Journal of Nonlinear Mechanics*. Online First DOI: 10.1016/j.ijnonlinmec.2011.12.002 Key: citeulike:10175102. (first author is Dr. Shen’s student)
31. T. Letcher, M.-H. H. **Shen**, O. Scott-Emuakpor, T. George, and C. Cross, 2012, "An Energy-Based Critical Life Prediction Method for AL6061-T6", *Fatigue & Fracture of Engineering Materials & Structures*, Vol. 35, pp. 861-870. (first author is Dr. Shen’s student)
32. H. Ozaltun, H. **Shen**, P. Medvedev, 2011, "Assessment of Residual Stresses on U10Mo Alloy Based Monolithic Mini-Plates during Hot Isostatic Pressing", *Journal of Nuclear Materials*, Vol. 419, Issue 1-3, pp. 76-84. (first author is Dr. Shen’s student)
33. O. Scott-Emuakpor, T. George, C. Cross, and M.-H. H. **Shen**, 2011, "Analysis of Strain Energy Behavior Throughout a Fatigue Process," *Experimental Mechanics*, Vol. 51, No. 8, pp. 1317-1323. (first author is Dr. Shen’s student)
34. H. Ozaltun, M.-H. H. **Shen**, T. George, and C. Cross, 2011, "An Energy Based Fatigue Life Prediction Framework for In-Service Structural Components" *Experimental Mechanics*, Vol. 51, Issue 5, pp. 707-718. (first author is Dr. Shen’s student)

35. W. Tarar, O. Scott-Emuakpor, and M.-H. H. **Shen**, 2010, "Development of New Finite Elements for Fatigue Life Prediction in Structural Components" *Journal of Structural Engineering and Mechanics*, Vol. 35, No.6, pp. 659-676. (first author is Dr. Shen's student)
36. W. Tarar, M.-H. H. **Shen**, T. George, and C. Cross, 2010, "A New Finite Element Procedure for Fatigue Life Prediction of Al6061 Plates under Multiaxial Loadings" *Journal of Structural Engineering and Mechanics*, Vol. 35, No.5, pp. 571-592. (first author is Dr. Shen's student)
37. O. Scott-Emuakpor, M.-H. H. **Shen**, T. George, and C. Cross, 2010, "Multi-Axial Fatigue-Life Prediction via a Strain-Energy Method", *AIAA Journal*, Vol. 48, No. 1 pp.63-72. (first author is Dr. Shen's student)
38. O. Scott-Emuakpor, T. George, C. Cross, and M.-H. H. **Shen**, 2010, "Hysteresis-loop representation for strain energy calculation and fatigue assessment", *The Journal of Strain Analysis for Engineering Design*, Vol. 45, No. 4, pp. 275-282. (first author is Dr. Shen's student)
39. Scott-Emuakpor, O, **Shen**, M-HH, George, T, Cross, C, and Calcaterra, J, 2008, "A New Energy-Based Uniaxial Fatigue Life Prediction Method for Gas Turbine Engine Materials," *ASME Journal of Engineering for Gas Turbines and Power*, Vol. 130, pp. 1-15. (first author is Dr. Shen's student)
40. O. Scott-Emuakpor, M.-H. H. **Shen**, C. Cross, J. Calcaterra, and T. George, 2007, "Development of an Improved High Cycle Fatigue Criterion" *ASME Journal of Engineering for Gas Turbines and Power*, Vol. 129, Issue 1, pp. 162-169. (first author is Dr. Shen's student)
41. T. George, M.-H. H. **Shen**, C. Cross, and T. Nicholas, 2006, "A New Multiaxial Fatigue Testing Method for Variable-Amplitude Loading and Stress Ratio", *ASME Journal of Engineering for Gas Turbines and Power*, Vol 128, pp. 857-864. (first author is Dr. Shen's student)
42. T. George, M.-H. H. **Shen**, O. Scott-Emuakpor, T. Nicholas, C. Cross, and J. Calaterra, 2005, "Goodman Diagram Via Vibration-Based Fatigue Testing", *ASME Journal of Engineering Materials and Technology*, Vol. 127, No. 1, pp. 58-64. (first author is Dr. Shen's student)
43. T. George, J. Seidt, M.-H. H. **Shen**, C. Cross, and T. Nicholas, 2004, "Development of A Novel Vibration-Based Multiaxial Fatigue Testing Methodology", *International Journal of Fatigue*, Vol. 26, pp. 477-486. (first author is Dr. Shen's student)
44. T. Meink, M.-H. H. **Shen**, and Steven Huybrechts, 2002, "Processing Induced Warpage of Filament Wound Composite Cylindrical Shells", *Journal of Composite Materials*, Vol. 36, pp. 1025-1047. (first author is Dr. Shen's student).

45. M.-H. H. **Shen** and T. Nicholas, 2001, "Reliability High Cycle Fatigue Design of Gas Turbine Blading System using the Probabilistic Goodman Diagram", *Key Engineering Materials*, Vol. 200, pp. 139-162.
46. T. George, M.-H. H. **Shen**, S. Huybrechts, T. Meink, and P. Wegner, 2001, "Optimal Design of Composite ChamberCore Structures", *Composite Structures* (an international journal) Vol. 52, issue3-4, pp. 277-286. (first author is Dr. Shen's student).
47. H.-Y. Yen and M.-H. H. **Shen**, 2001, "Passive Vibration Suppression of Turbine Blades Using Magnetomechanical Coating", *Journal of Sound and Vibration*, Vol. 245, no. 4, pp. 701-714. (first author is Dr. Shen's student).
48. M.-H. H. **Shen** and C. Pierre, 2001, "Authors' Reply", *Journal of Sound and Vibration*, Vol. 244, no. 4.
49. M.H. Herman **Shen**, 2000, "Reliability High Cycle Fatigue Design of Gas Turbine Blading System Using Probabilistic Goodman Diagram", in *PROBABILISTIC APPROACHES TO FRACTURE AND FATIGUE*, Editor, W.O. Soboyejo, Trans-Tech Publications.
50. D. Lanning and M.-H. H. **Shen**, 2000, "Reliability of Welded Structures Containing Heat Affected Zones", *ASME Journal of Offshore Mechanics and Arctic Engineering*, Vol.122, pp.1-8. (first author is Dr. Shen's student)
51. M.-H. H. **Shen**, 1999, "Reliability High Cycle Fatigue Design of Gas Turbine Blades Using the Probabilistic Goodman Diagram", *International Journal of Fatigue*, Vol.21, No.7, pp.699-708.
52. T. Meink, Steve Huybrechts, Jeff Ganley, and M.-H. H. **Shen**, 1999, "The Effect of Varying Thickness on the Buckling of Orthotropic Plates", *Journal of Composite Materials*, Vol. 33, No. 11, pp. 1048-1061 (first author is Dr. Shen's student).
53. D. Lanning and M.-H. H. **Shen**, 1999, "Reliability of Welded Structures with Short Fatigue Cracks", *ASME Journal of Offshore Mechanics and Arctic Engineering*, Vol. 121, pp.153-158. (first author is Dr. Shen's student)
54. M.-H. H. **Shen**, "Sensitivity Analysis of the Optimal Solution Obtained from the Structural Damage Identification Process", 1997, *RECENT ADVANCES IN MULTIDISCIPLINARY ANALYSIS AND OPTIMIZATION*, pp 65-70.
55. D. Lanning and M.-H. H. **Shen**, 1996, "Reliability of Welded Structures Containing Fatigue Cracks", *ASME Journal of Offshore Mechanics and Arctic Engineering*, Vol. 118, pp. 300-306. (first author is Dr. Shen's student)

56. P. Y. Tsou and M.-H. H. **Shen**, 1996, "Motion Control of Adaptive Truss Structures Using Fuzzy Rules", *Microcomputers in Civil Engineering*, Vol. 11, pp. 275-281. (first author is Dr. Shen's student)
57. M.-H. H. **Shen**, 1996, "Passive Vibration Suppression of Rotating Blades Using Piezoelectric Devices", *SPIE Smart Structures and Materials*, Vol. 2720, pp. 240-246, A special issue of SPIE publication.
58. M. S. Shen and M.-H. H. **Shen**, 1995, "Crack Extension under General Plane Loading" *International Journal of Fracture*, Vol.70, pp.51-58. (first author is Dr. Shen's student)
59. M.-H. H. **Shen**, 1995, "A New Modeling Technique for Piezoelectrically Actuated Beams", *Computers & Structures*, Vol, 57, No. 3, pp. 361-366.
60. D. Detwiler, M.-H. H. **Shen**, and V. B. Venkayya, 1995, "Two-Dimensional Finite Element Analysis of Laminated Composite Plates Containing Distributed Piezoelectric Actuators and Sensors", *Finite Elements in Analysis and Design*, Vol.20, pp. 87-100. (first author is Dr. Shen's student)
61. P. Y. Tsou and M.-H. H. **Shen**, 1995, "Design of Fuzzy Controller for Adaptive Truss Structures", *Journal of Intelligent Material Systems and Structures*, Vol.6, pp.283-291. (first author is Dr. Shen's student)
62. M.-H. H. **Shen** and M. S. Shen, 1994, "Probability of Failure and Risk Assessment of Structures with Fatigue Cracks", *AIAA Journal*, Vol. 32, No.12, pp. 2447-2455.
63. P. Y. Tsou and M.-H. H. **Shen**, 1994, "On The Ducking Problem of Variable Geometry Truss Manipulator", *Adaptive Structures and Composite Materials, AD-Vol.45/MD-Vol.54*, pp. 389-394. A special issue of ASME publication. (first author is Dr. Shen's student)
64. M.-H. H. **Shen**, 1994, "Analysis of Beams Containing Piezoelectric Sensors and Actuators", *Journal of Smart Materials and Structures*, Vol.3, pp. 439-447. (Cited by 47)
65. P. Y. Tsou and M.-H. H. **Shen**, 1994, "Structural Damage Detection and Identification Using Neural Networks", *AIAA Journal*, Vol. 32, No. 1, pp. 176-183. (first author is Dr. Shen's student) (Cited by 120)
66. M.-H. H. **Shen** and C. Pierre, 1994, "Free Vibration of Beams with a Single-Edge Crack", *Journal of Sound and Vibration*, Vol. 170, No. 2, pp. 237-259. (Cited by 67)
67. M.-H. H. **Shen** and J. E. Grady, 1992, "Free Vibrations of Delaminated Beams", *AIAA Journal*, Vol.30, No.5, pp.1361-1370. (Cited by 129)
68. M.-H. H. **Shen** and Y. C. Chu, 1992, "Vibrations of Beams with A Fatigue Crack" *Computers & Structures*, Vol.45, No.1, pp.79-93. (Cited by 62)

69. Y. C. Chu and M.-H. H. **Shen**, 1992, ``Analysis of Forced Bilinear Oscillators and Its Application to Cracked Beam Dynamics'', *AIAA Journal*, Vol. 30, No. 10, pp. 2512-2519. (first author is Dr. Shen's student) (Cited by 42)
70. M.-H. H. **Shen**, ``On-Line Structural Damage Detection'', *STRUCTRONIC SYSTEMS: SMART STRUCTURES, DEVICES AND SYSTEMS*, Vol. 4: Smart Materials and Structures, Editors, H.S. Tzou and Ardeshir Guran, pp.271-332, 1990.
71. M. H. **Shen** and J. E. Taylor, 1991, ``An Identification Problem for Vibrating Cracked Beams'', *Journal of Sound and Vibration*, Vol. 150, No.3, pp. 457-484.
72. M. H. **Shen** and C. Pierre, 1990, ``Natural Modes of Bernoulli-Euler Beams with Symmetric Cracks'', *Journal of Sound and Vibration*, Vol. 138, No. 1, pp. 115-134.

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73. M.-H. H. **Shen** and C. Pierre, ``Natural Modes of Bernoulli-Euler Beams with a Single-Edge Crack'', *AIAA/ASME/ASCE/AHS 31st Structures, Structural Dynamics and Materials Conference*, Vol. 4, pp. 2079-2093, Long Beach, California, April 1990.
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SYNERGISTIC ACTIVITIES:

- For the past thirty years, he has pioneered developments in structural health management framework and fatigue life prediction schemes for gas turbine engines, composites, power generation assets, wind turbines, offshore platforms, pipelines, and adhesive joints. His research contributions have been recognized by the research communities and acknowledged by the Industry Outlook Section of Aviation Week & Space Technology. The research communities have also recognized Dr. Shen’s recent research efforts in bridging the deep learning and engineering applications. He is a recipient of the Air Force Research Initiation Award, ALCOA Science Foundation Award, and The Ohio State University

College of Engineering Lumley Research Award. Dr. Shen has published more than 200 journal papers, book chapters, US Patents, and technical reports.

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- Ohio Aerospace Institute Collateral Faculty and Founder Member
- Member of SAE G-11 Committee on Probabilistic Methods in Engineering
- AIAA student advisor 1989-1995 and AIAA Student National Conference Advisor 1992
- Program Chairman, Aerospace Engineering Division; 7th Ohio Symposium on Advances in Science and Technology 1996
- Session Chair, ASME Turbo IGTI 2006, 2012, 2014, 2015, 2018 Conferences

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- *Flight Vehicle Structures (I) & (II)*
- *Preliminary Design of Flight Vehicle Structures*
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- *Optimal Aerospace Structural Design*
- *Reliability Engineering (II)*
- *Deep learning – Introduction*