Y. Jane Liu

Professor of Structural Mechanics

Areas of Specialty and Research Interests:

- Primary research interests include solid mechanics, computational mechanics, composite materials, plates and shells, vibration analysis, computational algebraic geometry, symbolic computer system in engineering applications.

Education:

- Ph.D., Structural Engineering, University of Hawaii at Manoa, Honolulu, 2002
- M.S., Structural Engineering, University of Hawaii at Manoa, Honolulu, 1998
- M.S. coursework completed, Structural Engineering, Southeast University, Nanjing, China, 1994
- B.S., Engineering solid mechanics, Hohai University, Nanjing, China.

Academic Experience:

- Professor, Department of Civil and Environmental Engineering, Tennessee Tech University, 2012–present
- Associate, Department of Civil and Environmental Engineering, Tennessee Tech University, 2007–2012
- Assistant, Department of Civil and Environmental Engineering, Tennessee Tech University, 2002–2007
- Teaching Assistant, Lecturer, Department of Civil and Environmental Engineering, University of Hawaii at Manoa, 2001–2002
- Research Assistant, funded by NASA Langley Research Center under Grants NAG-1-1487 and NAG-1-1850, Department of Civil and Environmental Engineering, University of Hawaii at Manoa, 1995–2000

Courses Taught and Curriculum Development at TTU:

1. CEE 2100: Fundamentals of Engineering Mechanics
2. CEE 2110: Engineering Mechanics – Statics
3. CEE 3110: Mechanics of Materials
4. CEE 3120: Mechanics of Materials Lab
5. CEE 3320: Structural Mechanics
6. CEE/ME 4190/5190: Advanced Mechanics of Materials
7. CEE 6930: Theory of Elasticity
8. *CEE 7100: Advanced Computational Methods in Engineering
9. CEE/ME 7510/7600: Theory of Plates and Shells
10. CEE/ME 7610: Finite Element Analysis I
11. CEE/ME 7720/7670: Fiber-Reinforced Composite Materials

*Graduate Course Developed

Selected Publications and Presentations:

1. A. Paruchuri, V. Kurnool, J. Liu & S. Idem "Flat Oval Duct Deflection – Finite-Element Analysis," Journal Science and Technology for the Built Environment, published online 18 March, 2020. https://doi.org/10.1080/23744731.2020.1735263
2. T.M. Harrell, Y. J. Liu, J. Peddieson, "Application of Groebner basis methodology to geometrically nonlinear axisymmetric circular isotropic plates," Computers and Structures, under review, 2019.
3. Shane Paulson, John Peddieson, Jane Liu, and Steve Mills "A Parametric Study of Linear and Nonlinear Models for Moisture Diffusion in Composite Sandwich Structures", Journal of Composite Materials, April 2018, Issue 9, Volume 52, pp 1193-1201.
4. Colin G. Perry, Y. Jane Liu "Geometrically Nonlinear Analysis of Thin Rectangular Plates on a Pasternak Foundation Using Groebner Bases," peer reviewed full paper, Proceeding of the 6th Annual International Conference on Architecture and Civil Engineering (ACE) 2018 in Singapore, GSTF.
5. John Peddieson, Jane Liu, "Axisymmetric Deformation of a Materially Nonlinear Circular Plate," Meccanica, An International Journal of Theoretical and Applied Mechanics AIMETA, Springer, March 2017, Volume 52, Issue 4-5, pp 1035-1050.
6. David Elizandro, David Huddleston, Jane Liu, Guillermo Ramirez, Elizabeth Hutchins, "An Academic Program Assessment Methodology to Leverage the Integrated Higher Education Environment Created by the Complete College Tennessee Act (CCTA)," published at the ASEE's 123rd National Conference 2016, June 26-29, 2016, New Orleans, LA, USA.
7. Jane Liu, John Peddieson, "Application of Groebner Bases to Nonlinear Mechanics Problems," Mathematical Software – ICMS 2014, Volume 8592 of the Series Lecture Notes in Computer Science pp 398-405, Springer.
8. Jane Liu, John Peddieson "Evaluation of Groebner Basis Methodology as an Aid to Harmonic Balance," ASME Journal of Vibration and Acoustics, April 2014, Vol. 136 / 024502-1
9. Jane Liu, George Buchanan, John Peddieson "Application of Groebner Basis Methodology to Nonlinear Statics Cable," ASME Journal of Offshore Mechanics and Arctic Engineering, Nov. 2013, 135(4): 041601. No. OMAE-11-1100.
10. Y. J. Liu, G. R. Buchanan, "Free Vibration of Transversely Isotropic Solid and Thick-walled Toroidal Shells," International Journal of Structural Stability and Dynamics, 2006, vol. 6: No. 3, 359-575
11. G. R. Buchanan, Y. Jane Liu, "An Analysis of the Free Vibration of Thick-walled Isotropic Toroidal Shells," International Journal of Mechanical Sciences, 2005, vol. 47: 277-292
12. Y. Jane Liu, H.R. Riggs, "The MIN-N Family of Pure-Displacement, Triangular Mindlin Plate Elements," The Structural Engineering and Mechanics, An International Journal, 2005, vol.19: No. 3, 297-320
13. Y. Jane Liu, G. R. Buchanan, "Free Vibration of Stepped Cantilever Mindlin Plates," Journal of Sound and Vibration, 2004, vol. 271: 1083-1092
14. Colin G. Perry, Y. Jane Liu "Geometrically Nonlinear Analysis of Thin Rectangular Plates on a Pasternak Foundation Using Groebner Bases," Presented at the 6th Annual International Conference on Architecture and Civil Engineering (ACE) 2018 in Singapore, May 14-15, 2018.
15. Y. Jane Liu, "Application of Groebner Bases to Geometrically Nonlinear Analysis of Circular Plates on a Pasternak Foundation," the 6th International Congress on Mathematical Software, July 24-27, 2018, University of Notre Dame, South Bend, USA.
16. Aravind Shanmugasundaram, Y. Jane Liu, John Peddieson "An Application of the Method of Groebner Bases to a Geometrically Non-linear Free Vibration Analysis of Composite Plates" with, Presented at the 7th International Conference on Computational Methods ICCM 2016, Berkeley, CA, USA, August 1-4, 2016.

17. Y. Jane Liu, Bruno Buchberger, Markus Rosenkranz, and Alexander Maletzky "Examples of Non-commutative Groebner Bases to Plate Bending Analysis" presented at the 7th International Conference on Computational Methods ICCM 2016, Berkeley, CA, USA, August 1-4, 2016.
18. Markus Rosenkranz, Jane Liu, Alexander Maletzky, and Bruno Buchberger "Two-Point Boundary problems with One Mile Singularity and an Application to Graded Kirchhoff plates," Proceeding of Computer Algebra in Scientific Computing (CASC) September, 2015, Aachen, Germany.
19. Kallie Curtis, Tim Harrell, Jane Liu and John Peddieson "Torsional Property Measurement for Polycarbonate Using DIC Technique with 3D Printed Specimens," presented at the 1st International Digital Image Correlation Society Conference & Workshop, November, 2015, Columbia, SC, USA.
20. Tim Harrell, Steve Mills, Jane Liu and David Mills "Equi-Biaxial Loading of Rohacell 200WF," Presented at JEC Conferences Americas 2015, Houston, June, 2015, Houston, TX, USA.
21. Jane Liu, Bruno Buchberger, Markus Rosenkranz, Alexander Maletzky, Loredana Tec, Wolfgang Windsteiger "Application of Non-commutative Groebner Bases to Kirchhoff Circular Plates with Functionally Graded Materials," with presented at the 8th MSJ SI 2015, Seasonal Institute, Current Tends on Groebner Bases: the 50th Anniversary of Groebner Bases, August, 2015, Osaka, Japan.
22. Jane Liu, John Peddieson, "Application of Groebner Bases to Nonlinear Mechanics Problems," Proceeding of the ICMS 2014, 4th International Congress on Mathematical Software, August, 2014, Seoul, Korea.
23. John Peddieson, Jane Liu, "Quadrature Solutions for Large Deflection Statics Cable Problems," Proceeding of the ASME 2014 33rd International Conference on Ocean, Offshore and Arctic Engineering, June 2014, San Francisco, CA, USA
24. Jane Liu, Rafal Ablamowicz, "Groebner Bases in Teaching Computational Methods in Engineering," Proceeding of the ICMS 2014, 4th International Congress on Mathematical Software, August, 2014, Seoul, Korea.
25. Jane Liu, George Buchanan "Application of Groebner Basis Methodology to Nonlinear Analysis of an Underwater Cable," Proc. The ASME 2011 30th International Conference on Ocean, Offshore and Arctic Engineering, Rotterdam, the Netherlands, June 19-24, 2011.
26. Jane Liu, George Buchanan "An example of using the Groebner Bases in an inverse problem of damage prediction by inverse method in nonlinear plates," Proc. 10th National Congress on Computational Mechanics on CD, the Ohio State University, Columbus, Ohio, July 16-19, 2009.
27. Jane Liu, George Buchanan, "Application of Algebraic Geometry to Vibration Control of Geometrically Nonlinear Hygrothermal-Elastic Composite Plates," Proc. 45th Annual Technical Meeting Society of Engineering Science 2008 on CD, University of Illinois, Urbana-Champaign, Illinois, October 12-15, 2008.
28. Jane Liu, Rafal Ablamowicz "Using Maple Computer Algebra System in Teaching Mechanics Courses," Proc. 45th Annual Technical Meeting Society of Engineering Science 2008 on CD, University of Illinois, Urbana-Champaign, Illinois, October 12-15, 2008.
29. Rafal Ablamowicz, Jane Liu, "Solving Systems of Polynomial Equations with Groebner Bases: Examples and Applications," Proc. 45th Annual Technical Meeting Society of Engineering Science 2008 on CD, University of Illinois, Urbana-Champaign, Illinois, October 12-15, 2008.
30. Jane Liu, Rafal Ablamowicz "Advanced Computational Methods Course for Engineering Graduate Students," Proc. 44th Annual Technical Meeting Society of Engineering Science 2007 on CD, Texas A&M University, College Station, Texas, October 21-24, 2007.
31. George Buchanan, Jane Liu "Geometrically Nonlinear Vibration of thermo-elastic Plates with Method of Groebner Bases," Proc. 44th Annual Technical Meeting Society of Engineering Science 2007 on CD, Texas A&M University, College Station, Texas, October 21-24, 2007.
32. Robert VanDervort, Jane Liu "Geometrically Nonlinear Analysis of Rectangular Plates with the Groebner Bases," Proc. 44th Annual Technical Meeting Society of Engineering Science 2007 on CD, Texas A&M University, College Station, Texas, October 21-24, 2007

33. Rafal Ablamowicz, Jane Liu "A Note on the Rodrigues Matrix of Rotation," Proc. 44th Annual Technical Meeting Society of Engineering Science 2007 on CD, Texas A&M University, College Station, Texas, October 21-24, 2007.
34. Jane Liu, "Applications of Algebraic Geometry Methods to Damage Detection in Plates with Large Deformation," Proc. 9th US National Congress on Computational Mechanics 2007on CD, San Francisco, California, July 22 - 26, 2007.
35. Jane Liu, Sirisha Madhavapeddy, and George Buchanan "Algebraic Geometry Approach in the Modeling of a Free Vibration Analysis of Laminated Toroidal Shells with Elliptical Cross-Section," Proc. 43rd Annual Technical Meeting Society of Engineering Science 2006, University Park, Pennsylvania, August 13 - 16, 2006, 70
36. Rafal Ablamowicz, Jane Liu "On the Parallel Lines for Bézier Cubics and Surfaces," Proc. 43rd Annual Technical Meeting Society of Engineering Science 2006, University Park, Pennsylvania, August 13 - 16, 2006, 69
37. Siphay Douangvilay, Jane Liu "Free Vibration Analysis of a Bézier Cubic Composite Shell," Proc. 43rd Annual Technical Meeting Society of Engineering Science 2006, University Park, Pennsylvania, August 13 - 16, 2006, 63
38. Changyu Xue, Kenneth R. Currie, Kwun-Lon Ting, Jane Liu "Application of Groebner Basis on Profile Inspection," Proc. 43rd Annual Technical Meeting Society of Engineering Science 2006, University Park, Pennsylvania, August 13 - 16, 2006, 64
39. Eric S. Fox, Y. Jane Liu and George R. Buchanan "Vibration of a Tire Modeled as a Composite Three-Dimensional Toroidal Shell," Proc. 14th International Conference on Composites/NANO Engineering, July 2006, Boulder, Colorado July 2-8, 2006, CDROM-ICCE-14
40. Jane Liu, Rafal Ablamowicz "A Clifford Algebra Approach to Analysis of Shell Structures," Proc. 5th Hawaii International Conference on Statistics, Mathematics and Related Fields, January 2006, Honolulu, Hawaii, January 16 - 18, 2006, CDROM-1550-3747
41. Rafal Ablamowicz, Jane Liu "Applying Algebraic Geometry Methods to Engineering Problems," Proc. 5th Hawaii International Conference on Statistics, Mathematics and Related Fields, January 2006, Honolulu, IH, January 16 - 18, 2006, CDROM-1550-3747

Professional Registration:

- FE (EIT) Certified, State of Hawaii, 1997

Awards and Honors:

- College of Engineering Faculty Productivity Award, TTU, 2008/2009/2010
- The Center for Energy Systems Research (CESR) Faculty Summer Research, 2004
- The Center for Manufacturing Research (CMR) Faculty Summer Research, 2003
- Everett E. Black Scholarship, Department of Civil and Environmental Engineering, University of Hawaii at Manoa, 1997/1998/2000