

Arnold Lumsdaine

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ACADEMIC EXPERIENCE

- University of Tennessee, Knoxville, TN.** **2014-present**
Faculty Member, Bredesen Center for Interdisciplinary Research and Graduate Education.
- University of Tennessee, Knoxville, TN.** **2001-2007**
Associate Professor, Mechanical Engineering.
- University of Texas-Pan American, Edinburg, TX.** **1996-2001**
Assistant Professor, Mechanical Engineering. On leave of absence from August 1997–August 1998

PROFESSIONAL EXPERIENCE

- Oak Ridge National Laboratory, Oak Ridge, TN.** **2009-present**
- Group Leader, Fusion Engineering
 - Senior R&D Engineer, Fusion Energy Division. Lead engineer, Materials Plasma Exposure eXperiment (MPEX) project, leading role for design and analysis of high heat flux divertor components, high field electromagnetic coils, radio frequency launchers, high vacuum vessels, plasma facing systems, and other components in domestic and international collaborations related to fusion energy research projects.
- Agilent Technologies, Oak Ridge, TN (after acquisition of MTS Nano Instruments).** **2008-2009**
- Manager, Strategic Planning and Product Development. Responsible for developing and implementing business strategy, planning and managing the development of new products, maintaining intellectual property portfolio, overseeing research programs and academic partnerships, and developing finite element tools.
- MTS Nano Instruments, Oak Ridge, TN.** **2007-2008**
- R&D Manager. Responsible for establishing and managing research programs and personnel, maintaining intellectual property portfolio (including patent application and litigation support), launching and managing process for new product development, participating in international and domestic testing standards committees, attending academic conferences and investigating funding and partnership opportunities.
- Ford Motor Company, C3P Education and Training, Dearborn, MI.** **1997-1998**
- Senior Training Specialist. (On leave of absence from the University of Texas–Pan American). Trained Ford designers, CAE analysts, manufacturing engineers, product engineers, and managers in the I-DEAS CAD/CAM/CAE and Metaphase PDM software. Was responsible for developing course material. Training involved classroom instruction as well as on the job instruction.
- Ford Motor Company, Dearborn, MI.** **1992-1997**
- Continuing Education Consultant. Taught a continuing education course in vibrations for Ford Motor Company engineers. The sixteen-hour course was taught four times a year.
- Ford Motor Company, Dearborn, MI.** **1986-1994**
- Mechanical Engineering summer intern. Completed a variety of analysis, design, and programming projects.

EDUCATION

- Ph.D. in Mechanical Engineering, University of Michigan, Ann Arbor** **May 1996**
M.S.E. in Mechanical Engineering, University of Michigan, Ann Arbor **May 1991**
B.S.E. in Mechanical Engineering, University of Michigan, Ann Arbor **December 1989**

PUBLICATIONS

1. A. Lumsdaine, R. Maingi, S. Gourlay, S. Prestemon, X. Wang, D. Humphreys, Y. Katoh, C. Kessel, and D. Whyte, "Perspectives on the FESAC Transformative Enabling Capabilities: Priorities, Plans and Status," Fusion Engineering and Design, Vol 155, June 2020, 111529.
2. A. Lumsdaine, S. Chakraborty Thakur, J. Tipton, M. Simmonds, J. Caneses, R. Goulding, D. McGinnis, F. Tynan, J. Rapp, and J. Burnett, "Testing and Analysis of Steady-State Helicon Plasma Source for the Material Plasma Exposure eXperiment (MPEX)," submitted to Fusion Engineering and Design, October 2019.
3. J. Rapp, A. Lumsdaine, C. Beers, T. Biewer, T. Bigelow, T. Boyd, J. Caneses, J. Caughman, R. Duckworth, R. Goulding, W. Hicks, C. Lau, P. Piotrowicz, D. West, D. Youchison, and the MPEX team, "The Material Plasma Exposure eXperiment: Mission and Conceptual Design," Fusion Engineering and Design, Vol. 156, July 2020, 111586.
4. A. Lumsdaine, C. Luttrell, D. McGinnis, K. Logan, R. Hicks, S. Meitner, J. Rapp and the MPEX team, "Conceptual Design and Analysis of In-Vessel Components for the Materials Plasma Exposure eXperiment (MPEX)," IEEE Transactions on Plasma Science, Vol. 48, No. 6, pp. 1446-1451, 2020.
5. M. Gehrig, D. Youchison, A. Lumsdaine, H. Greuner, B. Böswirth, J. Klett, and R. Dinwiddie, "Transient computational and experimental thermal analysis of graphite foam monoblock," IEEE Transactions on Plasma Science, Vol. 48, No. 6, pp. 1519-1524, 2020.
6. R.C. Duckworth, E.E. Burkhardt, A. Lumsdaine, J. Rapp, W.R. Hicks, T. Bjorholm, W.D. McGinnis, M. Anerella, R. Gupta, J. Muratore, P. Joshi, J. Cozzolino, P. Kovach, A. Marone, S. Plate, K. Amm, and J.A. Demko, "Conceptual Design and Performance Considerations for Superconducting Magnets in the Material Plasma Exposure eXperiment," IEEE Transactions on Plasma Science, Vol. 48, No. 6, pp. 1421-1427, 2020.
7. J. Rapp, C. Lau, A. Lumsdaine, C.J. Beers, T.S. Bigelow, T.M. Biewer, T. Boyd, J.F. Caneses, J.B.O. Caughman, R. Duckworth, R.H. Goulding, R. Hicks, N. Kafle, P.A. Piotrowicz, D. West and the MPEX Team, "The Materials Plasma Exposure eXperiment (MPEX): Status of the physics basis together with the conceptual design and plans forward," IEEE Transactions on Plasma Science, Vol. 48, No. 6, pp. 1439-1445, 2020.
8. V. Qeral, E. Rincón, S. Cabrera, A. Lumsdaine, F. A. Volpe, and F. Tabarés, "High-field Ignition-capable Stellarator i-ASTER: Initial Structural Evaluation," IEEE Transactions on Plasma Science, Vol. 48, No. 6, pp. 1842-1848, 2020.
9. J. Lore, Y. Gao, J. Geiger, H. Hoelbe, H. Niemann, M. Jakubowski, G. Wurden, S. Lazerson, P. Drewelow, A. Ali, A Puig Sitjes, A. LeViness, H. Frerichs, T. Barbui, F. Effenberg, J. Harris, A. Lumsdaine, J. Boscary, and the W7-X team, "Measurement and Modeling of Magnetic Configurations to Mimic Overload Scenarios in the W7-X Stellarator," Nuclear Fusion, Vol. 59, No. 6, 2019.
10. A. Lumsdaine, J.B. Tipton, D.L. Youchison, V. Varma, K. Logan, and J. Rapp, "High Heat-Flux Target Design for the Materials Plasma Exposure eXperiment," Fusion Science and Technology, Vol. 75, No. 7, pp. 674-682, October 2019.
11. R. Maingi, A. Lumsdaine, J.P. Allain, L. Chacon, S.A. Gourlay, C.M. Greenfield, J.W. Hughes, D. Humphreys, V. Izzo, H. McLean, J.E. Menard, B. Merrill, J. Rapp, O. Schmitz, C. Spadaccini, Z. Wang, A.E. White, and B.D. Wirth, "Summary of the FESAC Transformative Enabling Capabilities Panel Report," Fusion Science and Technology, Vol. 75, No. 3, pp. 167-177, April 2019.
12. J. Rapp, A. Lumsdaine, C.J. Beers, T.M. Biewer, T.S. Bigelow, J.F. Caneses, J.B.O. Caughman, R.H. Goulding, N. Kafle, C. Lau, E. Lindquist, P. Piotrowicz, H.B. Ray, M. Showers, and the MPEX team, "Latest Results from Proto-MPEX and the Future Plans for MPEX," Fusion Science and Technology, Vol. 75, No. 7, pp. 654-663, October 2019.
13. D.L. Youchison, T. Gray, A. Lumsdaine, J.W. Klett, B. Jolly, M. Gehrig, J.W. Coenen, S. Brezinsek, and M. Rasinski, "Development and Performance of Tungsten-Coated Graphitic Foam for Plasma Facing Components," Fusion Science and Technology, Vol. 75, No. 6, pp. 551-557, August 2019.

14. D.L. Youchison, M. Gehrig, A. Lumsdaine, J.W. Klett, H. Greuner, and B. Boeswirth, "High Heat-Flux Response of High-Conductivity Graphitic Foam Monoblocks," Fusion Engineering and Design, Vol 146, Part A, pp. 417-420, September 2019. 10.1016/j.fusengdes.2018.12.081
15. D.L. Youchison, S. Brezinsek, A. Lumsdaine, J.W. Klett, J.W. Coenen, C. Parish, A. Ievlev, J. Oelmann, C. Li, M. Rasinski, Y. Martynova, Ch. Linsmeier, S. Ertmer, and A. Kreter, "Plasma Exposures of a High-Conductivity Graphitic Foam for Plasma Facing Components," Nuclear Materials and Energy, Vol. 17, pp. 123-128, 2018.
16. M. Showers, T.M. Biewer, J.B.O. Caughman, D.C. Donovan, R.H. Goulding, A. Lumsdaine, and J. Rapp, "Helicon Power Source Analysis of the Prototype Material Exposure eXperiment (Proto-MPEX) using Fluoroptic Probes," submitted to Plasma Sources Science and Technology, March 2018.
17. M. Showers; P.A. Piotrowicz; C.J. Beers, T.M. Biewer, J. Caneses, J. Canik, J.B.O. Caughman, D.C. Donovan, R.H. Goulding, A. Lumsdaine, N. Kafle, L. W. Owen, J. Rapp and H. Ray, "Power accounting in the helicon region of plasma discharges in the linear device Proto-MPEX," Plasma Physics and Controlled Fusion, Vol. 60, No. 6, 065001, 2018.
18. A. Lumsdaine, J. Lore, D. McGinnis, J. Fellingner, and D. Loesser, "Thermal Analysis of Test Divertor Unit Scraper Element for Wendelstein 7-X," Fusion Engineering and Design, Vol. 136, part B, pp. 964-969, 2018.
19. A. Lumsdaine, S. Meitner, R. Goulding, J. Caneses, D. McGinnis, J. Rapp, and J. Burnett, "Design and Analysis of an Actively Cooled Window for a High Power Helicon Plasma Source," IEEE Transactions on Plasma Science, Vol. 47, No. 1, pp.902-909, 2019.
20. J. Boscary, H. Greuner, G. Ehrke, B. Böswirth, Z. Wang, E. Clark, A. Lumsdaine, J. Tretter, P. Junghanns, R. Stadler, D. McGinnis, J. Lore, and the W7-X Team, "Design and test of W7-X water-cooled Divertor Scraper," IEEE Transactions on Plasma Science, Vol. 46, No. 5, pp. 1398-1401, April 2018.
21. Wolf, R., et al, "Major Results from the First Plasma Campaign of the Wendelstein 7-X Stellarator," Nuclear Fusion, Vol. 57, 13pp, 102020, 2017.
22. E. Clark, A. Lumsdaine, J. Boscary, H. Greuner, and K. Ekici, "Thermal-hydraulics Modeling for Prototype Testing of the W7-X High Heat Flux Scraper Element," Fusion Engineering and Design, Vol. 121, pp. 211-217, 2017.
23. J. Rapp, T.M. Biewer, T.S. Bigelow, J.F. Caneses, J.B.O. Caughman, S.J. Diem, R.H. Goulding, R.C. Isler, A. Lumsdaine, C.J. Beers, T. Bjorholm, C. Bradley, J.M. Canik, D. Donovan, R.C. Duckworth, R.J. Ellis, V. Graves, D. Giuliano, D.L. Green, D.L. Hillis, R.H. Howard, N. Kafle, Y. Katoh, A. Lasa, T. Lessard, E. H. Martin, S.J. Meitner, G.-N. Luo, W.D. McGinnis, L.W. Owen, H.B. Ray, G.C. Shaw, M. Showers, V. Varma and the MPEX team, "Developing the Science and Technology for the Material Plasma Exposure eXperiment MPEX," Nuclear Fusion, Vol. 57, No. 11, 2017.
24. R. Duckworth, A. Lumsdaine, J. Rapp, T. Bjorholm, J. Caughman, J. Demko, R. Goulding, D. McGinnis, and the MPEX team, "Progress in Magnet Design Activities for the Material Plasma Exposure Experiment," Fusion Engineering and Design, Vol. 124, pp. 211-214, 2017.
25. J. Fellingner, D. Loesser, H. Neilson, A. Lumsdaine, D. McGinnis, J. Lore, G. Wurden, J. Wendorf, S. Klose, U. Wenzel, K. Grosser, K. Rummel, H. Hölbe, T. Sunn Pedersen, J. Mitchell, M. Sibilja, H. Zhang, P. Titus, and the W7-X team, "Integration of uncooled scraper elements and its diagnostics into Wendelstein 7-X," Fusion Engineering and Design, Vol. 124, pp. 226-230, 2017.
26. E. Clark, A. Lumsdaine, E. Ekici, and A. Ruggles, "Computational Investigation of the Thermal-Hydraulic Performance for Twisted Tape Enabled High Heat Flux Components," Fusion Science and Technology, Vol. 72, No. 3, pp. 278-284, 2017.
27. C. Luttrell, E. Coffey, I. Griffith, G. Hanson, A. Lumsdaine, and C. Schaich, "Analysis of the ITER ECH Waveguide Transmission Line Expansion Unit," Fusion Science and Technology, Vol. 72, No. 3, pp. 312-317, 2017.
28. D. Youchison, A. Melin, A. Lumsdaine, C. Schaich, and G. Hanson, "ITER ECH Waveguide Switch Design and Analysis," Fusion Science and Technology, Vol. 72, No. 3, pp. 324-330, 2017.

29. E. Coffey, G. Hanson, D. Hill, T. Jones, A. Lumsdaine, C. Luttrell, and C. Schaich, "Update on Cooling for the ITER ECH Waveguide Transmission Line," Fusion Science and Technology, Vol. 72, No. 3, pp. 505-509, 2017.
30. A. Lumsdaine, S. Meitner, V. Graves, C. Bradley, C. Stone, T. Lessard, D. McGinnis, J. Rapp, T. Bjorholm, R. Duckworth, and V. Varma, "Vacuum System and Modeling for the Materials Plasma Exposure Experiment," Fusion Science and Technology, Vol. 72, No. 4, pp. 581-587, 2017.
31. J. Tipton, A. Lumsdaine, C. Schaich, and G. Hanson, "Design and Analysis of 140-Degree Miter Bends for High Power Electron Cyclotron Heating Transmission Line," Fusion Science and Technology, Vol. 72, No. 4, pp. 616-622, 2017.
32. J. Rapp, T.M. Biewer, T.S. Bigelow, J.B.O. Caughman, R.C. Duckworth, R.J. Ellis, D. Giuliano, R.H. Goulding, D.L. Hillis, R. Howard, T.L. Lessard, J.D. Lore, A. Lumsdaine, E. Martin, W.D. McGinnis, S.J. Meitner, L.W. Owen, H. Ray, G. Shaw, V. Varma and the MPEX team, "The Development of the Material Plasma Exposure eXperiment MPEX," IEEE Transactions on Plasma Science, Vol. 44, No 12, pp. 3456-3464, December 2016.
33. A. Lumsdaine, J. Rapp, V. Varma, T. Bjorholm, C. Bradley, J. Caughman, R. Duckworth, R. Goulding, V. Graves, D. Giuliano, T. Lessard, D. McGinnis, and S. Meitner, "Pre-Conceptual Design Activities for the Materials Plasma Exposure Experiment," Fusion Engineering and Design, Vol. 109-111, Part B, pp. 1714-1718, November 2016.
34. J. Boscary, H. Greuner, G. Ehrke, B. Böswirth, Z. Wang, E. Clark, A. Lumsdaine, J. Tretter, D. McGinnis, J. Lore, and K. Ekici, "Prototyping Phase of the High Heat Flux Scraper Element of Wendelstein 7-X," Fusion Engineering and Design, Vol. 109-111, Part A, pp. 773-776, November 2016.
35. R. Duckworth, J. Demko, A. Lumsdaine, J. Rapp, T. Bjorholm, R. Goulding, J. Caughman, and W. McGinnis, "Cryogenic Considerations for Superconducting Magnet Design for the Material Plasma Exposure Experiment," IOP Conf. Series: Materials Science and Engineering, Vol. 101, 2015. doi:10.1088/1757-899X/101/1/012143
36. A. Lumsdaine, T. Bjorholm, J. Boscary, E. Clark, K. Ekici, J. Fellingner, J. Harris, H. Hölbe, J. Lore, D. McGinnis, G. Neilson, P. Titus, J. Tretter, and G. Wurden, "Overview of Design and Analysis Activities for the W7-X Scraper Element," IEEE Transactions on Plasma Science, Vol. 44, No. 9, pp. 1738-1744, September 2016.
37. H. Hölbe, T. Sunn Pedersen, J. Geiger, S. Bozhenkov, R. König, Y. Feng, J. Lore, and A. Lumsdaine, "Access to Edge Scenarios for Testing a Scraper Element in Early Operation Phases of Wendelstein 7-X," Nuclear Fusion, Vol. 56, No. 2, 11pp, 026015, February, 2016.
38. E. Clark, K. Ekici, A. Lumsdaine, C. Barbier, J. Harris, D. McGinnis, J. Lore, J. Boscary, and J. Tretter, "Thermal-Fluid Modeling of Single- and Two-Phase Flows in the W7-X Actively Cooled Scraper Element," Proceedings of the Symposium on Fusion Engineering, May 31-June 4, 2015, Austin, TX.
39. E. Clark, A. Lumsdaine, J. Boscary, K. Ekici, J. Harris, D. McGinnis, J. Lore, A. Peacock, and J. Tretter, "Multiphysics Analysis of the Wendelstein 7-X Actively Cooled Scraper Element," Fusion Science and Technology, Vol. 68, No. 3, pp. 635-639 2015.
40. P. Titus, H. Zhang, A. Lumsdaine, D. McGinnis, J. Lore, H. Neilson, T. Brown, J. Boscary, A. Peacock, and J. Fellingner, "Analysis of the Wendelstein 7-X Test Divertor Unit Scraper Element With Radiation Shields," Fusion Science and Technology, Vol. 68, No. 2, pp. 272-276, 2015.
41. C. Luttrell, E. Coffey, T. Bigelow, G. Hanson, A. Lumsdaine, A. Melin, D. Rasmussen, and C. Schaich, "Analysis of the ITER ECH Transmission Line Waveguide Coupling," Fusion Science and Technology, Vol. 86, No. 2, pp. 402-406, 2015.
42. E. Coffey, T. Bigelow, G. Hanson, A. Lumsdaine, C. Luttrell, D. Rasmussen, and C. Schaich, "Analysis of Cooling for the ITER ECH Waveguide Transmission Line," Fusion Science and Technology, Vol. 68, No. 2, pp 383-387, 2015.
43. A. Lumsdaine, J. Boscary, J. Fellingner, J. Harris, H. Hölbe, R. König, J. Lore, D. McGinnis, H. Neilson, P. Titus, J. Tretter, "Design of the Wendelstein 7-X Inertially Cooled Test Divertor Unit Scraper Element," Fusion Engineering and Design, Vol. 98-99, pp.1357-1361, 2015.

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45. A. Lumsdaine, J. Boscary, E. Clark, K. Ekici, J. Harris, D. McGinnis, J. Lore, A. Peacock, J. Tipton, and J. Tretter, "Modeling and Analysis of the W7-X Divertor Scraper Element," IEEE Transactions on Plasma Science, Vol. 42, pp. 545-551, 2014.
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53. A. Lumsdaine, J. Tipton, and M. Peng, "Thermal Fluid Multiphysics Optimization of Spherical Tokamak Centerpost," Fusion Engineering and Design, Vol. 87, No. 7-8, pp. 1190-1194, 2012.
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68. F. Speckhart, D. Fant, M. Parang, A. Lumsdaine, G. Robson, and K. Kahn, "The Combined MS-MBA Program: An Integrated Engineering and Business Approach to Product Development," submitted to the ASEE Southeast Section Annual Conference, Chattanooga, TN, April, 2005.
69. M. Damu, A. Lumsdaine and M. Parsons, "Optimization of Carbon Nanotube Reinforced Composite Laminated Structures for Vibration Damping," Proceedings of the SPIE 12th Annual Symposium on Smart Structures and Materials, San Diego, CA, March 2005.
70. M. Parsons, A. Lumsdaine, and J. Jiang, "Topology Optimization Of Active Control Vibration Damping Layers," Proceedings of the SPIE 12th Annual Symposium on Smart Structures and Materials, San Diego, CA, March 2005.
71. Hamel, W., Kim, S., Zhou, R., Lumsdaine, A., Brown, K., Sridharan, S., and Ganti, K., "Design and Testing of a Prototype Transmission-based Robot Servoactuator," Proceedings of the 2004 IEEE International Conference on Robotics and Automation, New Orleans, LA, September 2004.
72. J. Boulet, A. Lumsdaine, and J. Wasserman, "The Transition from Textbook Problems to Realistic Problems," Proceedings of the ASEE Annual Meeting, Salt Lake City, UT, June 2004.
73. R. Pai, A. Lumsdaine, and M. Parsons, "Design and Fabrication of Optimal Constrained Layer Damping Topologies," Proceedings of the SPIE 11th Annual Symposium on Smart Structures and Materials, San Diego, CA, 2004.

74. W. Hamel, S. Kim, R. Zhou, and A. Lumsdaine, "Dynamic Modeling and Analysis of a Transmission-based Robot Servoactuator," Proceedings of the 2003 IEEE International Conference on Robotics and Automation, Taipei, Taiwan, September 2003.
75. A. Lumsdaine and R. Pai, "Design of Constrained Layer Damping Topologies," Proceedings of the Adaptive Structures and Material Systems Symposium of the 2003 ASME International Mechanical Engineering Congress and Exposition, Washington, D.C., 2003.
76. A. Lumsdaine and N. Ratchukool, "Multimedia Tutorials for Drawing Shear Force and Bending Moment Diagrams," Proceedings of the ASEE Annual Meeting, Nashville, TN, 2003.
77. R. Jendruko, R. Bennet, T. Boulet, J. Iannelli, A. Lumsdaine and J. Wasserman, "The Use of Asynchronous Web Modules for Review and Just-in-time Learning of Mechanics," Proceedings of the ASEE Annual Meeting, Nashville, TN, 2003.
78. J. Drenckhan and A. Lumsdaine, "Design of a Piezoelectric Actuator Using Topology Optimization," Proceedings of the SPIE 10th Annual Symposium on Smart Structures and Materials, San Diego, CA, 2003.
79. A. Lumsdaine, "Topology Optimization of Constrained Damping Layer Treatments," Proceedings of the Adaptive Structures and Material Systems Symposium, 2002 ASME International Mechanical Engineering Congress and Exposition, New Orleans, LA, 2002.
80. D. Delgado, A. Fuentes, R. Jones, and A. Lumsdaine, "Quantitative Determination of the Stability of Implant Bone Interface Using Resonance Frequency Analysis," Proceedings of the ASME International Mechanical Engineering Congress and Exposition, 2002 ASME International Mechanical Engineering Congress and Exposition, New Orleans, LA, 2002.
81. A. Lumsdaine, "Modeling of Active Constrained Layer Damping Structures Using a Commercial Finite Element Code," Proceedings of the ASME International Mechanical Engineering Congress and Exposition, 2001 ASME International Mechanical Engineering Congress and Exposition, New York, NY, 2001.
82. A. Garcia, A. Lumsdaine, and Y. Yao, "Comparison of Static and Dynamic Stiffness for Beams Undergoing Flexural and Torsional Loading with an Intermediate Mass", Proceedings of the ASME Noise Control and Acoustics Division, pp. 461-469, 2000 ASME International Mechanical Engineering Congress and Exposition, Orlando, FL, 2000.
83. A. Lumsdaine, A. Garcia, and Y. Yao, "Shape Optimization of Isotropic Composite Beams Undergoing Harmonic Flexural and Torsional Loading," Proceedings of the ASME Noise Control and Acoustics Division, pp. 237-245, 1999 ASME International Mechanical Engineering Congress and Exposition, Nashville, TN, 1999.
84. A. Garcia, A. Lumsdaine, and Y. Yao, "Optimization of an Automotive Structure Subject to Harmonic Excitation," Proceedings of the ASME Noise Control and Acoustics Division, pp. 217-222, 1999 ASME International Mechanical Engineering Congress and Exposition, Nashville, TN, 1999.
85. A. Lumsdaine and R.A. Scott, "Shape Optimization of Unconstrained Viscoelastic Layers Using Continuum Finite Elements," Journal of Sound and Vibration, Vol. 216, No. 1, pp. 29-52, 1998.
86. A. Lumsdaine and R.A. Scott, "Parameter Studies in the Optimal Design of Unconstrained Beam Damping Layer Treatments," Proceedings of the ASME Noise Control and Acoustics Division, pp. 117-125, 1997 ASME International Mechanical Engineering Congress and Exposition, Dallas, TX, 1997. Awarded "Best Paper" for the Noise Control and Acoustics Division (of 50 papers).
87. A. Lumsdaine and R.A. Scott, "Optimal Design of Constrained Plate Damping Layers Using Continuum Finite Elements," Proceedings of the ASME Noise Control and Acoustics Division, pp. 159-168, 1996 ASME International Mechanical Engineering Congress and Exposition, Atlanta, GA, 1996.
88. A. Lumsdaine and R.A. Scott, "Optimal Design of Unconstrained Damping Layers Using Continuum Finite Elements," Proceedings of NOISE-CON 96, National Conference on Noise Control Engineering, pp. 509-514, Bellevue, WA, 1996.
89. A. Lumsdaine and R.A. Scott, "Shape Optimization of Unconstrained Beam and Plate Damping Layers," Proceedings of the ASME 14th Biennial Conference on Mechanical Vibration and Noise, Vol. 84-3, Pt. C, pp. 15-22, Boston, MA, 1995.

Presentations/Posters (contributor or co-author)

- A. Lumsdaine, J. Boscary, J. Fellingner, J. Harris, H. Hölbe, R. König, D. McGinnis, J. Lore, H. Neilson, A. Peacock, P. Titus, J. Tretter, “Instrumentation and Analysis of the W7-X Intertially Cooled Test Divertor Unit Scraper Element Design,” presented at the 2014 Technology of Fusion Energy Conference (TOFE) in Anaheim, CA, November 12, 2014.
- A. Lumsdaine, G. Hanson, T. Bigelow, C. Schaich, C. Luttrell, E. Coffey, A. Melin, and E. Popov, “Thermal and Structural Analysis of ECH Waveguide Components,” presented at the 21st International Conference on Nuclear Engineering (ICONE) in Chengdu, China, August 1, 2013.
- A. Lumsdaine, J. Lore, D. McGinnis, J. Harris, J. Tipton, J. Canik, A. Peacock, J. Boscary, and J. Tretter, “Multiphysics Thermal-Fluid Analysis of the W7-X Divertor Scraper Element,” presented at the 21st International Conference on Nuclear Engineering (ICONE) in Chengdu, China, July 31, 2013.
- A. Lumsdaine, J. Boscary, E. Buckman, K. Ekici, J. Harris, D. McGinnis, J. Lore, A. Peacock, and J. Tretter, “Wendelstein 7-X High Heat-Flux Divertor Scraper Element,” invited presentation at the 25th Symposium on Fusion Engineering (SOFE 25) in San Francisco, CA, June 13, 2013.
- A. Lumsdaine, C. Barbier, T. Bigelow, E. Coffey, J. Hansen, G. Hanson, C. Luttrell, A. Melin, E. Popov, D. Rasmussen, and C. Schaich, “Multiphysics Modeling of Components for the ITER ECH Waveguide,” presented at the 25th Symposium on Fusion Engineering (SOFE 25) in San Francisco, CA, June 13, 2013.
- A. Lumsdaine, “Making a Star on Earth – the Future of Fusion Energy,” Graduate Seminar at Michigan Technological University on October 18, 2012.
- A. Lumsdaine, J. Tipton, J. Lore, J. Canik, J. Harris, A. Peacock, J. Boscary, and D. McGinnis, “Design and Analysis of the W7-X Divertor Scraper Element” presented at the 20th International Conference on Nuclear Engineering (ICONE) in Anaheim, CA, July 31, 2012.
- A. Lumsdaine, C. Barbier, T. Bigelow, and C. Schaich, “Multiphysics Analysis of ECH Waveguide Components” at the 20th International Conference on Nuclear Engineering (ICONE) in Anaheim, CA, July 31, 2012.
- A. Lumsdaine, J. Lore, D. McGinnis, J. Tipton, J. Canik, J. Harris, A. Peacock, J. Boscary, J. Tretter, and T. Andreeva, “Design and Analysis of the W7-X Divertor Scraper Element” presented at the 27th Symposium on Fusion Technology (SOFT) in Liege, Belgium, September 24, 2012.
- A. Lumsdaine, “Making a Star on Earth – the Future of Fusion Energy,” Keynote Talk for the University of Evansville Math, Engineering, and Science Undergraduate Research Conference (MESCON) on March 24, 2012.
- A. Lumsdaine, J. Tipton, and M. Peng, “Design Optimization of ST Centerpost for Fusion Nuclear Science Facility,” presented at the Joint Meeting of 5th IAEA Technical Meeting on Spherical Tori 16th International Workshop on Spherical Torus (ISTW2011) in Toki, Japan, September 30, 2011.
- A. Lumsdaine and M. Peng, “Thermal Fluid Multiphysics Optimization of Spherical Tokamak Centerpost” co-authored by Martin Peng, presented at the 2011 International Symposium on Fusion Nuclear Technology (ISFNT) in Portland, OR, September 13, 2011.
- A. Lumsdaine, T. Brown, M. Cole, P.J. Fogarty, J. Harris, P. Heitzenroeder, K. Logan, G. McGinnis, H. Neilson, T. Rummel, and L. Wegener, “United States Contribution to Wendelstein 7-X,” presented at the 2011 Symposium on Fusion Engineering (SOFE) in Chicago, IL, June 29, 2011.
- A. Lumsdaine and M. Peng, “Structural Analysis of an Optimally Designed Spherical Tokamak Centerpost,” presented at the 2011 Symposium on Fusion Engineering (SOFE) in Chicago, IL, June 27, 2011.
- A. Lumsdaine and M. Peng, “Optimal Design of Active Cooling for High Duty Cycle Spherical Tokamak Centerpost,” presented at the 2011 International Conference on Emerging Nuclear Energy Systems (ICENES) in San Francisco, CA, May 16, 2011.

- A. Lumsdaine, J. Tipton, M. Sawan, E. Marriott, M. Dagher, and C. Wong, “Thermal Transfer of Helium Cooled, Roughened Surfaces for Fusion Test Blanket,” presented at the 2010 Technology of Fusion Energy Conference (TOFE) in Las Vegas, NV, November 10, 2010.
- E.G. Herbert, W.C. Oliver, A. Lumsdaine, and G.M. Pharr, “Nanoindentation and the Mechanical Characterization of Viscoelastic Solids,” presented at the 2009 SEM Annual Conference & Exposition on Experimental and Applied Mechanics, Albuquerque, NM, June 3, 2009.
- E.G. Herbert, A. Lumsdaine, R.B. Peters, and W.C. Oliver, “In Situ Examination of Nanoscale Deformation of Thin Film Bridges within a Scanning Electron Microscope,” 2008 MRS Fall Meeting – Symposium EE: Nano- and Microscale Materials – Mechanical Properties and Behavior under Extreme Environments, Boston, MA, December 1, 2008.
- E.G. Herbert, W.C. Oliver, A. Lumsdaine, and G.M. Pharr, “Measuring the Constitutive Behavior of Viscoelastic Solids in the Time and Frequency Domain using Flat Punch Nanoindentation,” Society of Engineering Science 45th Annual Technical Meeting, Urbana-Champaign, IL, October 15, 2008.
- C. Su, R.B. Peters, A. Lumsdaine, W.C. Oliver, G.M. Pharr, “In Situ SEM Mechanical Testing,” 2008 Gordon Research Conference – Thin Films and Small Scale Mechanical Behavior, Waterville, ME, July 30, 2008.
- E. G. Herbert, W. C. Oliver, A. Lumsdaine, G. M. Pharr, Nanoindentation and the Dynamic Characterization of Viscoelastic Solids, Mechanics of Time Dependent Materials Conference, Monterey, CA, April 3, 2008.
- E.G. Herbert, W.C. Oliver, A. Lumsdaine, G.M. Pharr, “Comparing Viscoelastic Functions Measured by Nanoindentation and Transformations from the Frequency Domain to the Time Domain,” 2008 MRS Spring Meeting – Symposium U: Mechanics of Nanoscale Materials, San Francisco, CA, March 27, 2008.
- A. Lumsdaine, A Chaudhri, M. Parang, B. Nelson, S. Sridharan, and S. Tang, “Structural Integrity of Quasi-Poloidal Stellarator (QPS) Magnetic Coils,” 21st IEEE/NPSS Symposium on Fusion Engineering, Oak Ridge, TN, September 28, 2005.

EXTERNAL FUNDING

- Oak Ridge National Laboratory, Co-PI** **October 2002 - August 2007**
“Quasi-Poloidal Stellarator”–contract for \$1,500,000 to conduct design, analysis, and manufacturing for fusion reactor magnetic coils.
- NSF Partnership for Innovation, PI** **September 2005 - August 2007**
“Innovating, Inventing, and Commercializing Engineering Technologies”–grant for \$600,000 to develop entrepreneurship and commercialization content into the engineering curriculum. Project involved 20 public and private partners, and twelve faculty across three colleges (engineering, business, and law).
- NSF Civil and Mechanical Systems Division, PI** **August 2003 - July 2007**
“Topology Optimization of Active and Passive Damping Materials”–grant for \$222,116 to design optimal topologies for vibration damping.
- Black and Decker, Co-PI** **January 2004 - December 2004**
“Vibration Control / Elimination – Reciprocating Saws”–grant for \$10,000 to examine various concepts for the reduction of vibration levels on a Reciprocating Saw.
- Innovative Technology Center, University of Tennessee, Co-PI** **October 2002 - January 2004**
“An Asynchronous Mechanics Module to Transition from Textbooks to Realistic Problems”–grant for \$15,000 to develop instructional modules in statics, dynamics, and solid mechanics.
- DOE – National Energy Technology Laboratory, Co-PI** **October 2001 – January 2004**
“Transmission-Based Electrical Servoactuators”–contract for \$400,000 to design and develop transmission-based actuators for telerobotics applications.
- DOE – National Energy Technology Laboratory, Co-PI** **October 2001 – March 2003**
“Human Machine Cooperative Telerobotics”–contract for \$155,000 to design and develop a sensor head for telerobotics applications.
- NSF CCLI Educational Materials Development, Co-PI** **June 2001 - April 2004**
“Implementation of Pedagogies for Interactive Computer and Web-Based Undergraduate Learning”–grant for \$324,190 to develop instructional modules for engineering graphics, statics, and dynamics.
- NASA Faculty Awards for Research, PI** **September 1999 - August 2002**
“Optimal Design of Hybrid Passive Viscoelastic and Active Piezoelectric Damping Layers”–grant for \$300,000 with NASA Marshall Space Flight Center to perform shape optimization studies on hybrid damping layers.
- DOD Infrastructure Support for HBCU/MI, PI** **June 2000 - November 2001**
“Implementation of UNIX Based Laboratory for Interactive Learning”–grant for \$187,000.
- Sun Microsystems, PI** **June 2000 - November 2001**
“UNIX-Based Hardware for Teaching and Research”–Grant for \$103,860.
- ITI Foundation, Co-PI** **July 2000 - August 2001**
“Evaluation of Dental Implant Osseointegration Using Vibration Modal Analysis”–grant for \$98,000.
- Ford Motor Company–Visteon, PI** **August 1998 - May 2000**
“Optimal Design of Cross Car Structures”–grant for \$26,000.

STUDENTS ADVISED

PhD Students

- Shing-Jia Tang (graduated May 2007)
- Emily Clark (graduated May 2017)

Master's Students

- Arnaldo Garcia (graduated December 1999)
- Joachim Drenckhan (graduated May 2003)
- Rohan Pai (graduated December 2003)
- Sriram Sridharan (graduated May 2004)
- Mohan Damu (graduated December 2005)
- Harish Valluru (graduated December 2006)
- Ahmed Elalfy (graduated December 2006)
- Matthew Parsons (graduated May 2007)

Undergraduate Research Students

- Cormack Gordon (January 2002 – December 2003)
- Matthew Parsons (May 2003 – August 2004)
- Sara Piepenbring (May 2004 – April 2005)
- Stephen Young (May 2004 – August 2004)
- Kevin Shipp (May 2005 – May 2006)

Undergraduate Academic Advising

- Academic advisor for 50 Mechanical Engineering undergraduate students at the University of Tennessee.

INSTRUCTIONAL ACTIVITIES

Courses taught

- **University of Tennessee, Knoxville**
 - Undergraduate (number of times taught)
 - Aerospace Structures (1)
 - Mechanics of Materials (7)
 - Dynamics (1)
 - Senior Seminar (4)
 - Engineering Entrepreneurship (1)
 - Product Development, Selection, and Evaluation (1)
 - Graduate (number of times taught)
 - Design Optimization (2)
 - Smart Structures and Materials (2)
 - Computational Solid Mechanics – Finite Elements (2)
- **University of Texas-Pan American**
 - Undergraduate (number of times taught)
 - Introduction to Engineering (1)
 - Engineering Technology Lab (1)
 - Engineering Mechanics (2)
 - Mechanics of Materials (5)
 - Mechanics of Materials Lab (1)
 - Engineering Analysis (2)
 - Mechanical Vibrations (4)
 - Mechanical Systems Laboratory (4)
 - Graduate (number of times taught)
 - Finite Element Analysis (2)
 - Design Optimization (1)

Innovative Instructional Course Development

- Completed Innovative Technology Center Teaching with Technology grant with Jack Wasserman, Toby Boulet, and Richard Bennett. Project materials are available online at: <http://web.utk.edu/~alumsdai/twtmech/>
- Completed UT College of Engineering Technology Enhanced Course Material Preparation Grant for developing multimedia course materials for ME 321. Project materials are available at: <http://web.utk.edu/~wratchuk/introduction/>

PROFESSIONAL ACTIVITIES

- Member American Nuclear Society (2010-present)
 - Previous Past Chair of Fusion Energy Division (2019-present)
 - Chair of Fusion Energy Division (2016-2019)
 - Vice-Chair of Fusion Energy Division (2014-2016)
 - Member of Fusion Energy Division Executive Committee (2011-2014)
- Member American Society of Mechanical Engineers (1996-present)
 - Member of Adaptive Structures and Material Systems Technical Committee
- Member Materials Research Society (2007-2010)
- Member American Society for Engineering Education (1996-2007)
 - Member Mechanics Division
 - Member Entrepreneurship Division
- Technical Program Chair for 2012 ANS Topical Meeting on the Technology of Fusion Energy (TOFE)
- Co-chair for 2006 Adaptive Structures and Material Systems Symposium at the ASME International Mechanical Engineering Congress and Exposition (16 scheduled sessions).
- Chair and organizer for the student paper competition for the ASME Adaptive Structures and Materials Technical Committee at the SPIE Smart Structures and Material Conference. (2004-2006).
- Co-Chair for SPIE Damping and Isolation Conference of the SPIE International Symposium on Smart Structures and Materials, 2006.
- On program committee for the Damping and Isolation Conference of the SPIE International Symposium on Smart Structures and Materials, 2005-present.
- On program committee for the Modeling, Signal Processing, and Control Conference of the SPIE International Symposium on Smart Structures and Materials, 2006.
- Panel reviewer for NSF Engineering Education program on 9/25/03-9/26/03.
- Reviewer for Fusion Science and Technology
- Reviewer for Fusion Engineering and Design
- Reviewer for IEEE Transactions on Plasma Science
- Reviewer for Acta Materialia
- Reviewer for the International Journal of the Mechanical Sciences
- Reviewer for the International Journal of the Physical Sciences
- Reviewer for the Journal of Vibration and Acoustics (Transactions of the ASME)
- Reviewer for the International Journal of Heavy Vehicle Systems
- Reviewer for the Journal of Intelligent Material Systems and Structures
- Reviewer for Mechanics Research Communications
- Reviewer for Journal of Materials Research

HONORS AND AWARDS

- 2003-2004 ExxonMobil Professor Award (MABE department award)
- 2004-2005 Pi Tau Sigma Excellence in Teaching Award (MABE department award; selection made by student honors society)