



## Elizabeth Ervin, PhD

### STRUCTURAL DYNAMICS, RISK VULNERABILITY, AND HEALTH EVALUATION

#### Education

PhD, 2006, Mechanical Engineering, Carnegie Mellon University

MS, 2001, Civil Engineering, Vanderbilt University

BS, 1999, Civil Engineering, *in cursu honorum*, Tennessee Technological University

**Years of Experience:** 12

#### Professional Affiliations

Monitoring, Sensing, and Modeling Committee, the Department of Homeland Security

American Society of Civil Engineers, Dynamics Committee

Society for Experimental Mechanics

American Society of Mechanical Engineers, Noise and Vibration Committee

Society of Women Engineers

American Society of Engineering Education, Civil SE Div. Chair, Campus Rep.

Chi Epsilon, National Civil Engineering Honor Society

Tau Beta Pi, National Engineering Honor Society

Phi Kappa Phi, National Research Honor Society

Climate Change Group, Univ. of Mississippi; Nuclear Rep.

#### Significant Awards

2009, School of Engineering Faculty Service Award

2012, School of Engineering Junior Faculty Research Award

2007, 2009, 2013 Ole Miss Highlighted Faculty

Grants from National Science Foundation, Department of Defense, US DOT, Nuclear Regulatory Commission

Dr. Elizabeth Ervin is currently an assistant professor in the Department of Civil Engineering; Director, the Multi-Function Dynamics Laboratory, University of Mississippi.

From September 2001 to March 2006, Dr. Ervin worked for Bettis Atomic Power Laboratory, a national laboratory run by Bechtel Bettis, Inc., a Department of Energy/U.S. Navy Contractor. She worked as Senior Engineer in the Reactor Technology Activity, Reactor Engineering Division, Structural Methods Analysis and Design, Shock and Vibration/Acoustic Design & Development, Noise, Vibration, & Shock. She designed and performed numerous shock and vibration experiments in Fundamental Shock and Vibration Test Laboratory. She was the Naval Reactors Cognizant Engineer of shock and vibration design manual and facilitator of communications between Naval Reactors and contractor organizations on shock topics.

Since 2006, Dr. Ervin has been faculty at the University of Mississippi. Using her extensive experience, she has built the Multi-Function Dynamics Laboratory, a fully functioning shock, vibration, and noise test facility. The most unique capability of this lab is a state-of-the-art high-speed camera, a Redlake Y4, that allows for optical instrumentation of any apparatus.

Dr. Ervin has collaborated with such government agencies as the Department of Homeland Security, the Department of Defense, the Department of Energy, the National Science Foundation, the Office of Naval Research, NASA, the Army Corps of Engineers, and both the U.S. and Mississippi Department of Transportation. She has also worked with Ducommun Miltec, Southern Nuclear Operating Company, Entergy Nuclear, Ball Aerospace, Caterpillar, and the University of Alabama Birmingham. She has also worked for the Tennessee Department of Transportation and the Air Force Research Laboratory, Air Vehicles Directorate Structures Division, Structural Design & Development, Multidisciplinary Center of Excellence.

Dr. Ervin's developed technical skills include both software and hardware expertise. An accomplished programmer, she is proficient in MATLAB, SAP2000, ProAnalyst, LaTeX, NASTRAN/PATRAN, ANSYS, LSDYNA, ABAQUS, NI LabVIEW, Mathcad, Mathematica, GIS, ProEngineer, and AutoCAD. As laboratory director, she executes all required functions from visionary to technician. She performs modal, random vibration, sinusoidal vibration, prescribed input vibration, and transient shock testing. She has expertise with instrumentation including impact hammers, accelerometers (PCB, Endevco, Kistler, B&K), StarModal, signal conditioners, signal analyzers (HP/Agilent), shaker controllers (MB Dynamics, Spectral Dynamics), non-contact laser interferometer (Polytec), optical sensors (Kaman, Philtec), high-speed photography (Redlake/Kodak), and lighting (Hubbell, B&H, Kodak).

## Relevant Experience

Dr. Ervin's research expertise and projects include infrastructure sustainability, disaster vulnerability assessment, damage detection algorithms, smart-sensing technologies, non-destructive testing, acoustical methods, flow-induced vibrations, closed-form computer modeling, nonlinear phenomena, finite element simulation, and contact/impact mechanics. Dr. Ervin works in multi-disciplinary fields that require civil engineering, mechanical engineering, electrical engineering, and computer science.

Dr. Ervin has significant experience in instruction. She co-taught shock and vibration for the Bettis Reactor Engineering School. At the University of Mississippi, she has taught 19 different courses for a total of near 50,000 student contact hours. She has successfully completed the ASCE's Excellence in Civil Engineering Education program as well as a study abroad in Japan. Dr. Ervin has produced 1 PhD and 3 MS degrees and currently advises 2 graduate students. Additionally, Dr. Ervin represents the university in engineering education and nuclear topics.

## Selected Publications and Presentations

- W. Xu, E. K. Ervin, "Parameters Affecting the Transient Response of an Impacting Beam," *Shock and Vibration* 20 (2013) 907-919.
- Steven B. Worley and Elizabeth Ervin, "Field Testing of the Ford Center Bridge," Mid-South Annual Engineering and Sciences Conference, The University of Mississippi, Oxford, MS, Oct 28-29, 2013.
- Elizabeth K. Ervin, "Algorithm Comparison for Structural Health Metrics," 2013 Structures Congress, Structural Engineering Institute, Pittsburgh, PA, May 2-4, 2013.
- Elizabeth K. Ervin, Engineering Statics Workbook: A Companion to Any Text, Kendall-Hunt Publishers, 2012, ISBN 978-1-4652-0046-4.
- Steven B. Worley and Elizabeth K. Ervin, "A Comparison of Structural Health Indicators," RAM Workshop, Society of Reliability Engineers, Huntsville, AL, October 16-17, 2012. 2<sup>nd</sup> place award.
- Samantha Sabatino and Elizabeth K. Ervin, "Experimental Damage Diagnosis of a Model Three-Story Spatial Frame," Intl. Modal Analysis Conf. XXX, Jacksonville, FL, January 30-February 2, 2012.
- Weiping Xu and Elizabeth K. Ervin, "Analysis of Transient Beam Behavior with Impact," *ASCE Journal of Engineering Mechanics*, v137, n11, p 779-784, 2011.
- Weiping Xu and Elizabeth K. Ervin, "First Principles Estimation of Shock Tube Tests on Nanoreinforced Composite Materials." *ASME Journal of Applied Mechanics*, V78, n6, 2011.
- Elizabeth K. Ervin, "From Sensing to Damage Identification in Unstable Buildings," Monitoring and Sensing of Near-Collapse Buildings Workshop," Department of Homeland Security, April 6-7, 2010.
- Elizabeth K. Ervin, "Infrastructure Health Evaluation via Experimental Techniques," NSF 2009 CMMI Grantees Conference, Honolulu, Hawaii, June 22-25, 2009. Technical Report, Poster, Highlight.
- E. K. Ervin, "Vibro-Impact of Two Orthogonal Beams," *ASCE Journal of Engineering Mechanics*, Vol. 135 (6), pp. 529-537, June 2009.
- Elizabeth K. Ervin, "A Pragmatic Course in Nuclear Engineering," *International Journal of Energy, Environment and Economics*, Volume 17 Issue 1, Pages 1-11, 2009.
- Elizabeth K. Ervin and Weiping Xu, "Vibration Course Enhancement through a Dynamic MATLAB® Graphic User Interface," 2009 ASEE Southeast Section Conference, Marietta, GA, April 5-7, 2009.
- E. K. Ervin, "Simulated Repetitive Impact in Orthogonal Continuous Structures," 8<sup>th</sup> World Congress on Computational Mechanics, June 30 - July 5, 2008, Venice, Italy.
- E. K. Ervin, J. Wickert, "Repetitive Impact Response of a Beam Structure Subjected to Harmonic Base Excitation," *Journal of Sound and Vibration*, Vol. 307(1-2), 23 October 2007, pages 2-19.

## Website Information

Full Publication Record, Homepage: <http://www.engineering.olemiss.edu/~eke>

Laboratory, Multi-Function Dynamics: <http://www.engineering.olemiss.edu/~eke/MFDL/index2.html>

Nuclear Engineering: <http://www.engineering.olemiss.edu/~eke/Nuclear/nuclear.html>