

Y. Charles Lu, Ph.D., P.E.

Assistant Professor

Department of Mechanical Engineering, University of Kentucky
P: (270) 534-3115 F: (270) 534-6292 Email: chlu@engr.uky.edu

Prof. Y. Charles Lu received his Ph.D. in Engineering Sciences from The University of Western Ontario in 2000. His research interests include: (1) micromechanics and nanomechanics, (2) polymers, elastomers, composites, and advanced materials, (3) finite element analysis and mechanical design, and (4) vibration control. His research has been supported by the automotive industry, the Air Force, NASA, Kentucky Space Grant Consortium, NSF, EPA, etc. He has authored over 80 papers in referred journals and conference proceedings and over 100 technical reports. Dr. Lu received the 2010 SAE International Ralph R. Teetor Educational Award for his contributions to mobility-related research, teaching and student development. He was awarded the ASEE Air Force Summer Faculty Fellowships in 2008 and 2009. He was also the recipients of the Outstanding Mechanical Engineering Faculty Award (2009), Paducah Outstanding Faculty Award (2009), Dana Engineering Achievement Award (2002), Dana Technical Achievement Awards (2002-2006), and several poster awards co-authored with students. Dr. Lu is licensed Professional Engineer in the state of Kentucky.

PROFESSIONAL APPOINTMENTS

- Visiting Scientist** Air Force Research Laboratory, Branch of Composites and Hybrid Materials, Wright-Patterson Air Force Base, Ohio (June-August, 2010)
- Research Scientist** Air Force Research Laboratory, Branch of Composites and Hybrid Materials, Wright-Patterson Air Force Base, Ohio (May-August, 2009)
- Research Scientist** Air Force Research Laboratory, Branch of Composites and Hybrid Materials, Wright-Patterson Air Force Base, Ohio (May-August, 2008)
- Visiting Researcher** Air Force Research Laboratory, Branch of Advanced Composites, Wright-Patterson Air Force Base, Ohio (June-August, 2007)
- Assistant Professor** Department of Mechanical Engineering, University of Kentucky, Kentucky (2006 - Present)

Senior Development Engineer Dana Corporation (2004-2006)

Senior Finite Element Analysis Engineer Dana Corporation (2001-2004)

Research Scientist Akron Rubber Development Laboratory, Akron, Ohio (2000-2001)

PROFESSIONAL SERVICES

Member

Member, Society of Automotive Engineering (SAE)

Senior Member, American Institute of Aeronautics and Astronautics, (AIAA)

Member, American Society of Mechanical Engineering (ASME)

Member, American Society of Engineering Education (ASEE)

Member, Society for Experimental Mechanics (SEM)

Associate Member of Rubber Division of American Chemistry Society (ACS)

Committee

Member, Polymers and Coatings Committee, Society of Automotive Engineering (SAE)

Member, Adhesives and Sealants Committee, Society of Automotive Engineering (SAE)

Member, SAE Transaction Journals Review Committee (SAE)

Member, Systems Engineering Constituent Committee (ASEE)

Member, SAE 2007 Noise and Vibration Conference General Committee

Member, SAE 2009 Noise and Vibration Conference General Committee

Member, Scholarship and Award Committee, Society of Automotive Engineering (SAE)

Member, Composites and Heterogeneous Materials Committee (ASME)

Conference Organizing

Co-Organizer, Track on Mechanics of Time-Dependent Materials and Processes in
Conventional and Multifunctional Materials, SEM Conference,
Mohegan Sun, Uncasville, Connecticut, June 13 - 15 (2011)

Co-Organizer, Symposium on Time Dependent Constitutive Behavior and Failure
/Fracture Processes, SEM Conference, Indianapolis, IN, June (2010)

Member, Conference General Committee, Society of Automotive Engineering NVH
Conference, St. Charles, IL, May, 2009

Member, Conference General Committee, Society of Automotive Engineering NVH
Conference, St. Charles, IL, May, 2007

Section Chairs

Chair, Shape Memory Polymers Section, Symposium on Time-dependent Materials,

SEM Conference for Experimental and Applied Mechanics, Indianapolis, IN
June, 2010.

- Chair, Automotive Composites Section, Society of Automotive Engineering (SAE)
World Congress, Detroit, MI, April, 2010
- Chair, Advances in Coatings and Sealants Section, Society of Automotive Engineering
(SAE) World Congress, Detroit, MI, April, 2010
- Chair, Nanoindentation Section, Symposium on Time-dependent Materials,
SEM Conference for Experimental and Applied Mechanics,
Albuquerque, NM, June, 2009.
- Chair, Automotive Composites Section, Society of Automotive Engineering (SAE)
World Congress, Detroit, MI, April, 2009
- Co-Chair Numerical Methods Section, Society of Automotive Engineering NVH
Conference, St. Charles, IL, May, 2009
- Chair, Analysis and Measurements in Nanomaterials, ASME International
Mechanical Engineering Congress, Boston, MA, November, 2008
- Chair, Advanced Modeling, New Technologies and Methods, Symposium on
Advanced Automotive Technologies, ASME International Mechanical
Engineering Congress, Boston, MA, November, 2008
- Chair, Advances in Experimental Mechanics, ASME International Mechanical
Engineering Congress, Seattle, WA, November, 2007
- Co-Chair, Rubber in Aerospace Applications, 174 ACS Rubber Division Technical
Conference, Louisville, 2008
- Co-Chair, Rubber in Automotive Applications, 176 ACS Rubber Division Technical
Conference, Pittsburg, PA, 2009
- Chair, Soft Matter Section, Micro-/Nano-Mechanical Behavior of Low-Dimensional
Structures, Materials Science and Technology (MS&T) Conference,
Pittsburg, PA, October, 2008.
- Co-Chair Numerical Methods Section, Society of Automotive Engineering NVH
Conference, St. Charles, IL, May, 2007

RESEARCH INTERESTS

Micromechanics and Nanomechanics
Polymers, Elastomers, Composites, and Advanced Materials
Finite Element Analysis
Mechanical Design of Automotive and Aerospace Structures
Vibration control

CURRENT FUNDED PROJECTS

- (a) Adaptive, Active and Multifunctional Hierarchical Reinforced Polymer Composites and Hybrids for Micro Air Vehicles (the Air Force)
- (b) Mechanical Characterization of Shape Memory Polymers for Reconfigurable Aerospace Structures (NASA/KSGC)
- (c) High Temperature Polymer Matrix Composites for Aerospace and Space Applications (NASA/KSGC)
- (d) MRI: Nanomechanical Systems for in-situ Mechanical Characterization of Materials in Application Environments (NSF)
- (e) Multi-scale Characterization of Shape Memory Polymers for Reconfigurable Aerospace Structures (NASA/KSGC)
- (f) Design of automotive structures

RESEARCH TEAM

Current members: Johnson Joseph (Ph.D.), Jared Fulcher (MS), S. Spandan Pulla (MS),
Conal Green (MS),

Previous members: David C Jones (MS), Siva Kurapati (MS).

RECENT PUBLICATIONS (last 5 years)

Papers in Refereed Journals (* corresponding author)

- J Q. Zhang, **Y.C. Lu***, F. Du., L. Dai, J. Baur., D.C. Foster, Viscoelastic creep of vertically aligned carbon nanotubes, *Journal of Physics, D: Applied Physics*, 43 (2010) 315401.
- J. T. Fulcher, **Y.C. Lu***, G. P. Tandon, D.C. Foster, Thermomechanical characterization of environmentally conditioned shape memory polymers, in progress.
- J. T. Fulcher, **Y.C. Lu***, G. P. Tandon, D.C. Foster, Thermomechanical characterization of shape memory polymers using high temperature nanoindentation, *Polymer Testing*, 29 (2010) 544–552.
- Chen, R, **Lu, Y.C.**, Yang, F, Tandon, G.P. and Schoeppner, G.A., “Impression Creep of PMR-15 Resin at Elevated Temperatures”, *Polymer Engineering and Science*, Volume 50, Issue 1, pp: 209-213 (2010). DOI 10.1002/pen.21532.
- **Lu, Y.C.***, D.C. Jones, G. P. Tandon, S, Putthanarat, G. A. Schoeppner, “High Temperature Nanoindentation of PMR-15 Polyimide”, *Experimental Mechanics*, (2010). 50, Number 4, Pages 491-499, DOI 10.1007/s11340-009-9254-5.
- **Lu, Y.C.*** and Shinozaki, D.M, “Temperature dependent viscoelastic properties of polymers investigated by small-scale dynamic mechanical analysis”, *Experimental Mechanics*, 50:71–77 (2010). DOI 10.1007/s11340-008-9215-4.
- Rong Chen, Fuqian Yang, **Y. Charles Lu***, “Impression Creep of Lightweight Alloys”, *SAE International Journal of Materials and Manufacturing*, (2010).
- Jones, D.C., Pulla, S.S. and **Lu, Y.C.***, “Thermo-oxidation and mechanical properties of polymer composites used in high-temperature environments: a review”, *SAE International Journal of Materials and Manufacturing*, (2010).
- **Lu, Y.C.***, G. P. Tandon, D.C., Jones, G. A. Schoeppner, “Elastic and viscoelastic characterization of thermally-oxidized polymer resin using nanoindentation”, *Journal of Mechanics of Time-Dependent Materials*, 13: 245–260 (2009) DOI 10.1007/s11043-009-9088-7.
- **Lu, Y.C.***, G. P. Tandon, S, Putthanarat, G. A. Schoeppner, “Nanoindentation strain rate sensitivity of PMR-15 Polyimide”, *Journal of Materials Science*, 44:2119–2127 (2009). DOI 10.1007/s10853-009-3311-4.
- Nash, D.A., **Lu, Y.C.***, Anderson, M.E., “Finite Element Analysis of Elastomeric Isolation System for Cam Cover Vibration”, *International Journal of Vehicle Design*, Vol. 49, No. 4, pp.287–302 (2009).

- H. Periyathamby, Nash, D.A., Anderson, M.E., **Lu, Y.C.***, “NVH Characteristics of 5.4L 3V Thermoplastic Composite Engine Cover”, *International Journal of Vehicle Noise and Vibration*, Vol. 5, No. 3, pp.205–218 (2009).
- **Lu, Y.C.**, Kurapati, S. K. N. and Yang, F., “Finite element analysis of deep indentation by a spherical indenter”, *Journal of Materials Science*, Vol. 43, Issue 18, p6331-6336 (2008).
- **Lu, Y.C.***, Kurapati, S. K. N. and Yang, F., “Finite element analysis of cylindrical indentation for determining plastic properties of small volumes of materials”, *Journal of Physics, D: Applied Physics*, 41 (2008) 115415.
- Shinozaki, D.M*, Lo, J.C.W., and **Lu, Y.C*.**, “Depth Dependent Displacement Modulated Indentation in Oriented Polypropylene”, *Materials Science and Engineering (A)*, 491 182-191 (2008).
- **Lu, Y.C.*** and Shinozaki, D.M, “Characterization and Modeling of Large Displacement Micro-/Nano-indentation of Polymeric Solids”, *ASME Journal of Engineering Materials and Technology*, Vol. 130, Oct. 1-7 (2008).
- **Lu, Y.C.***, “Fractional derivative viscoelastic model for frequency-dependent complex moduli of automotive elastomers”, *International Journal of Mechanics and Materials in Design*, Vol.3, 329-336, (2007).
- **Lu, Y.C.***, “Effects of viscoelastic properties of engine cover sealing system on noise and vibration attenuation”, *International Journal of Mechanics and Materials in Design*, Vol.3, 277-284 (2007).
- Lo., L, **Lu, Y.C.** and Shinozaki., D.M., “Kink Band Formation during Micro-indentation of Oriented Polypropylene”, *Materials Science and Engineering (A)*, Vol. 409 76-86 (2005).
- **Lu, Y.C.** and Shinozaki, D.M., “Substrate Constraint on Micro-indentation Testing of Polymer Coatings”, *Materials Science and Engineering (A)*, Vol. 396 77-86 (2005).
- **Lu, Y.C.*** and D’Souza, K., “Acoustic Analysis of Isolated Engine Valve Covers”, *Journal of Passenger Cars – Mechanical Systems*, p2122-2130 (2004).