Wenqiong (Wen) Tu

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Summary of Qualifications

- Extensive experience (6 years) in structural and stress analysis via various finite element software
- Extensive experience (6 years) in programming and code development for solid mechanics applications
- Proficiency in analysis and design of various structural components
- 6 peer-reviewed journal articles in composite materials, structural analysis, fracture and damage, finite deformation, plasticity, optimization, biomaterials

Education

University of Virginia (UVA), PhD (2015) Charlottesville, VA, US

- Applied mechanics in Civil Engineering; GPA 3.9/4.0

Huazhong University of Science and Technology (HUST) Wuhan, China

- **B. S.** in Engineering Mechanics, 2008, GPA 3.7/4.0; **M. S.** in Solid Mechanics, 2010, GPA 3.8/4.0

Skills: ANSYS, LS-DYNA, Abaqus, HyperMesh, Python, Matlab, Fortran, Unix, AutoCAD

Work Experience

- **Applied mechanics, UVA** Charlottesville, VA

Graduate Research Assistant January 2011- present

- **"Investigation of damage evolution in composite materials with finite volume homogenization"**
  - Developed a numerical tool in modeling crack initiation and growth with high efficiency and excellent stability.
  - Simulated fiber/matrix debonding in SiC/Ti composites and damage evolution in cross-ply laminates.
  - One peer-reviewed article has been published and two sequential papers are in the writing process.
- "**Modeling of the mechanical response of periodic composite materials with Abaqus**"
  - Utilized python to create periodic unit cell with required microstructures and post-process output data.
  - Modeled the mechanical responses (elastic-plastic, damage, hyperelastic) of polymer and metal matrix composites and biomimetic materials.
- "**Finite deformation analysis and optimization of bio-inspired materials**"
  - Developed an efficient homogenization-based Particle Swarm Optimization (PSO) method.
  - Optimized unit cell architectures of heart-valve chordae tendineae using parallelized PSO algorithm.
  - Research results are published in a journal article and featured by the Global Medical Discovery website.
- **"Plastic strain localization in periodic materials with wavy brick-and-mortar architectures"**
  - Direct and assist the research work of 3 fourth year undergraduates
  - Systematically examined the combined effects of waviness and platelet arrangement on the elastic-plastic response of periodic materials with bio-inspired microstructures with wavy architectures.

- **Solid mechanics, HUST** Wuhan, China

Graduate Research Assistant September 2008-November 2010

- **"Study of the delamination of fiber/Aluminum laminates under low-velocity impact"**
  - Simulated delamination between single plies via Cohesive Zone Model (CZM) in LS-DYNA.
  - Quantitated plastic effects of Al plies in absorbing impact energy and in reducing delamination between plies.
  - Identified the preferred stacking sequence for laminates with strong delamination resistance.
- **"Strength analysis and optimization of Carbon Fiber Reinforced Plastic (CFRP) joints**"
  - Designed CFRP joints with AutoCAD and created 3D finite element model in ANSYS.
  - Predicted the delamination bearing strength of CFRP joints considering contact effects.
  - Optimized the delamination bearing strength via PSO approach by varying ply angles.

Undergraduate Research Assistant May 2007-June 2008

- **"Stress and strength analysis of tube connections on air cooled heat exchanger"**

- Built 3D finite element model in ANSYS from technical drawing provided by collaborated company.
- Carried out stress analysis to check stress distribution at tube connections and verified the strength of steel.

Journal Articles

- **W. Tu** and M. J. Pindera, 2015. Damage Evolution in Cross-Ply Laminates Revisited via CZM-Based Finite-Volume Homogenization (in preparation).
- A. Katz, C. Trinh, J. Wright, **W. Tu**, M. J. Pindera, Plastic Strain Localization in Periodic Materials with Wavy Brick-and-Mortar Architectures and Its Effect on the Homogenized Response, Composites Part B: Engineering, 2015,68,270-278.
- **W. Tu** and M. J. Pindera, Cohesive Zone-Based Damage Evolution in Periodic Materials via Finite-Volume Homogenization, Journal of Applied Mechanics, 2014, 81: 101005(1-16).
- **W. Tu** and M. J. Pindera, Targeting the Finite-deformation Response of Wavy Biological Tissues with Bio-inspired Material Architectures, 2013, Journal of the Mechanical Behavior of Biomedical Materials, 2013, 28: 291-308.
- **W. Tu,** J. Chen, J. Wei, Study on the Delamination of Fiber-metal Laminates under Low-velocity Impact, Chinese Journal of Solid Mechanics, 2012, 33(2): 182-188.
- W. Peng, J. Chen, J. Wei., **W. Tu**, Optimal Strength Design for Fiber Metal Laminates, Journal of Composite Materials, 2010, 45: 237-254.
- W. Peng, J. Chen, M. Gu, **W. Tu**, A Particle Swarm Optimization(PSO) Algorithm for Minimizing Interlaminar Normal Stresses at the Free-edge of Composite laminates, Mechanical Science and Technology for Aerospace Engineering,2009, 28(11):1496-1500.

Selected Conference Presentations

- **W. Tu** and M. J. Pindera, A Unified Methodology for the Homogenization of Periodic Materials with Damage, Proceedings of the 4th International Conference on Integrity, Reliability and Failure, 23-27 June 2013, Funchal, Portugal, pp. 793-794.
- **W. Tu,** Z. Tang, M.J. Pindera, Interfacial Damage Mechanics of Composite Materials Via Finite-Volume Micromechanics, 20th Annual International Conference on Composite Materials, July 22-28, 2012, Beijing, CHINA.
- M.J. Pindera, **W. Tu,** M. Cavalcante, K. Bixel, Microstructural Effects in Tailoring the Response of Engineered Bio-Materials, 2012 NSF CMMI Engineering Research and Innovation Conference, July 9–12, Boston.

Journal Reviews

- Journal of Reinforced Plastics and Composites

Honors and Awards

- Travel Award for Graduate Students (2012) - University of Virginia
- Excellent Master Thesis in Hubei Province, China (2011)
- Excellent Graduate Student (2009) - Huazhong Univ. of Sci. & Tech
- Excellent undergraduate (2008) - Huazhong Univ. of Sci. & Tech
- Excellent Thesis of Undergraduate (2008) - Huazhong Univ. of Sci. & Tech