WENQIONG (WEN) TU

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Qualifications:

- Over 6 years of experience in finite element analysis with Abaqus, ANSYS, LS-DYNA
- Extensive experience in programming with MATLAB and Python, optimization and analysis of composite materials
- Excellent analytical skills and deep understanding of fundamental physics and material behaviors
- Familiarity with HyperMesh, fatigue analysis via fe-safe, Vibration Analysis, optimization via Isight and Tosca, and design via CATIA, AutoCAD
- Problem-solver with 9 journal articles and 4 peer-reviewed conference papers in structural and material modeling

Education

University of Virginia (UVA), Ph.D. Charlottesville, VA, US

- Applied mechanics in Civil Engineering; GPA 3.9/4.0

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

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

Skills: Abaqus, ANSYS, LS-DYNA, HyperMesh, fe-safe, Isight, Tosca, 3DEXPERIENCE, Matlab, Python, Fortran, CATIA, AutoCAD

Work Experience

- **Dassault Systèmes Simulia Corp** Minneapolis, MN

Technical Intern June 2015- November 2015

- "**Consulting project on 3D arbitrary fracture modeling via 3D cohesive elements with Abaqus**"
  - Utilized python to insert 2D cohesive elements between arbitrary adjacent 2D solid elements by generating new nodes
  - Extruded 2D mesh to 3D mesh and adjusted the nodal connectivity of the 3D cohesive elements
  - Successfully delivered a 3D fracture simulation workflow for the customer under various loading types
- Resolved customer problems in a timely manner via independent research and by collaborating with Abaqus experts
- Participated in extensive trainings with Abaqus in Modeling Fracture and Failure, Writing User Subroutines, Contact and Convergence Issue, Flexible Multibody Systems, Abaqus/Explicit: Advanced Topics, Linear Dynamics, and training in Fe-safe, Isight, Tosca and 3DEXPERIENCE platform
- Critically examined and revised the training class of "Analysis of Composite Materials with Abaqus"

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

Graduate Research Assistant January 2011- August 2016

- **"Investigation of damage evolution in composite materials"**
  - Developed an efficient numerical tool in modeling crack initiation and propagation with excellent stability
  - Validated the method's accuracy in modeling interfacial debonding with developed analytical solutions and Abaqus
  - Simulated the damage evolution in laminates on the fly by considering transverse cracking and delamination
  - Uncovered new fundamental findings in debonding behaviors of SiC/Ti and graphite/polyimide composites
- "**Micromechanics analysis of fiber-reinforced periodic materials via Abaqus**"
  - Created unit cells in Abaqus CAE and automated the application of periodic conditions via python script
  - Applied unit strain and analyzed the unit cell 6 times to obtain a complete set of homogenized properties
  - Modeled the fiber/matrix interfacial debonding via cohesive elements and generated the homogenized responses
- "**Finite deformation analysis and optimization of bio-inspired materials**"
  - Developed an efficient homogenization-based Particle Swarm Optimization (PSO) method
  - Verified the newly developed optimization approach via extensive parametric studies
  - Optimized unit cell architectures and material properties of heart-valve chordae tendineae using parallelized algorithm

➢ **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

Journal Articles

- **W. Tu** and M. J. Pindera, 2016. Assessment of CZM-FVDAM and Abaqus predictive capabilities towards interfacial debonding of fiber reinforced composites (in preparation).
- **W. Tu** and M. J. Pindera, 2016. Dissipative response of unidirectional composites with two brittle constituents (in preparation).
- **W. Tu** and M. J. Pindera, Damage Evolution in Cross-Ply Laminates Revisited via CZM-Based Finite-Volume Homogenization, Composites Part B: Engineering, 2016, 86, 40-60.
- 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, CZM-Based FVDAM Analysis of Damage Evolution in Cross-Ply Laminates, American Society for Composites 30th Technical Conference, Sep 28-30, 2015, East Lansing, MI.
- **W. Tu**, Y. Yang and M. J. Pindera, Evaluation of homogenized moduli of composite materials with Finite-Volume micromechanics and Abaqus, SIMULIA Regional User Meetings, Sep 22-23, 2015, Minneapolis, MN.
- **W. Tu** and M. J. Pindera, A Unified Methodology for the Homogenization of Periodic Materials with Damage, the 4th International Conference on Integrity, Reliability and Failure, June 23-27 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.