William Matthew Peterson

Engineering Analyst

Bozeman, MT 59718 (406) 570-3807
mattp@wmpeterson.com wmpeterson.com

Summary

7+ years of experience performing Linear and Nonlinear Finite Element Analysis, specializing in progressive fracture models and analysis of composite materials. Advanced skill with Abaqus FEA, user subroutine development, model pre/post-processing, and mesh generation.

Skills

Programming
- Proficient: Python, Fortran, Matlab
- Familiar: OpenMP, C, C++, SQLite
- Language Interop: Fortran/C, Python/C

Lab Work
- Digital Image Correlation (DIC)
- Fiber-reinforced composites (FRC), adhesive joints, mechanical testing

Software and Technology
- FEA: Abaqus, ANSYS
- Other: SolidWorks, Microsoft Office, Windows, Linux, Git

Teaching, Writing, and Public Speaking
- Instruction of undergraduate FEA course
- Conference and journal publications
- Toastmasters Intl. member

Experience

Graduate Research Assistant *Aug. 2011 – Present*
Montana State University, Composite Technologies Research Group *Bozeman, MT*
- Developed novel framework for mesh generation and efficient progressive fracture models, integrated with Abaqus (CAE/Standard/Explicit) using Python and Fortran.
- Performed ASTM-based material tests on fiber-reinforced composites and adhesive joints.

Visiting Scholar *July 2014*
Sandia National Laboratories, Wind Energy & Water Power Technologies *Albuquerque, NM*
- 1-week training for ultrasonic non-destructive testing (NDT) of composite materials.

Engineering Analyst/Consultant *Dec. 2010 – Feb. 2011*
AutoPilot *Bozeman, MT*
- Developed prototype models with large strain, contact, and hyperelastic materials.

Graduate Teaching Assistant *Fall 2009, 2010, 2011*
Montana State University, Mechanical and Industrial Engineering *Bozeman, MT*
- Lab Instructor: “Intro to Finite Element Analysis” with ANSYS Mechanical & APDL.

Engineering Intern *Sept. 2008 – Feb. 2009*
Quantum Composers *Bozeman, MT*
- Production-level fabrication and assembly of electronic pulse generators.

Engineering Intern *May 2008 – Sept. 2008*
Montana State University, Space Science and Engineering Labs (SSEL) *Bozeman, MT*
- Design, machining, and testing of antenna deployment system of E1-P nanosatellite (link).

Education

Ph.D. Mechanical Engineering Aug. 2011 – Aug. 2018 (Exp.)
Montana State University *Bozeman, MT*

- Thesis: "A Selectively Activated Cohesive Zone Model with Arbitrary Interelement Crack Growth for the Finite Element Method." Advisor: Douglas Cairns

M.S. Mechanical Engineering *2009 – 2011*
Montana State University *Bozeman, MT*

- Thesis: "Effect of Fiber Diameter on Stress Transfer and Interfacial Damage in Fiber Reinforced Composites." Advisor: Christopher Jenkins (Ret.)

B.S. Mechanical Engineering *2004 – 2009*
Montana State University *Bozeman, MT*

Selected Publications & Conference Proceedings

Peterson, W. M., and Cairns, D. S. (2016). "A Selectively Activated Extrinsic Cohesive Model," *57th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*. AIAA SciTech, San Diego, CA. Paper AIAA 2016-0735 (link).

Peterson, W. M., and Cairns, D. S. (2015). "Modeling Crack Growth with Selectively Activated Cohesive Elements," *Composites & Advanced Materials Expo* (CAMX), Dallas, TX. Paper TP15-0294 (link).

Woo, K., **Peterson, W. M.**, and Cairns, D. S. (2014). "Selective Activation of Intrinsic Cohesive Elements," *Journal of Applied Mathematics and Physics*, Vol. 2, No. 12, pp. 1061-1068 (link).

Selected Research Portfolio

Robot Kinematics and Artificial Neural Networks *May 2014*

- Forward and inverse kinematics of a 3-DOF parallel manipulator using neural nets (link).

Viscoplastic Material Models and Displacement-Based Formulation for FEA *April 2014*

- Strain-hardening and strain-rate sensitive models for displacement-based FEA (link).

Selected Open-Source Projects

FortranHashDict: Dictionary Data Structure for Fortran 2003+ *Dec. 2017*

- A fast, easy-to-use data structure using a hashtable, singly-linked lists, and OOP (link).

UTRI3: User Element Subroutine for Abaqus *Dec. 2017*

- A 2D linear triangle User Element (UEL) for Abaqus/Standard, using OOP techniques (link).

Professional Activities, Leadership, and Service

- **Certificate:** Engineer in Training (EIT)
- **Member:** American Society of Mechanical Engineers (ASME)
- **Member:** Toastmasters Intl.
- **Volunteer:** FIRST Robotics Competition