Curriculum Vitae

Andrew E. Slaughter

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Materials Process Design and Control Laboratory
Sibley School of Mechanical and Aerospace Engineering
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Research and Teaching Interests

- Thermal modeling and behavior of porous materials
- Snow metamorphism, optics, and micro-structure and their associated roles in avalanches and climate change
- Engineering mechanics coursework including statics, mechanics of materials, and continuum mechanics
- Numerical analysis coursework such as finite element analysis and numerical methods

Education

- **PhD in Engineering (Applied Mechanics),** Montana State University (MSU), Bozeman, Apr. 2010
- **MS in Civil Engineering,** Washington State University (WSU), Pullman, Aug. 2004
- **BS in Civil Engineering,** Michigan Technological University (MTU), Houghton, Aug. 2002

Research Experience

Materials Process Design and Control Lab. (Cornell Univ. Postdoctoral Research), *Sept. 2011–present*
Topic: A Stochastic Phase-tracking Snow Micro-structure Model
- Researching and implementing a stochastic 3-D, phase-tracking finite element model of snow micro-structure
- Improving the collaborative tools at the MPDCL (`confluence.cornell.edu/display/mpdc/Home`)
- Developing a web-based outreach tool to make resulting research accessible

Subzero Science Research and Engineering Facility (MSU Postdoctoral Research), *Jun. 2010–Aug. 2010*
Topic: Snow Near-Surface Morphologies and Influence on Solar Albedo
- Assisted in development of techniques for measuring and analyzing the bi-direction reflectance distribution function of snow in the visible and near-infrared wavelengths

Subzero Science Research and Engineering Facility (MSU Doctoral Research), *Aug. 2004–Apr. 2010*
Topic: Driving Factors Governing the Near-Surface Morphology of Snow
- Utilized sensitivity analysis and a heat-transfer model to isolate important factors in near-surface metamorphism
- Performed laboratory simulations of near-surface facet metamorphism
- Established collaborative research with local ski patrol
- Designed, implemented, and distributed various software packages

Wood Materials and Engineering Laboratory (WSU Masters Research), *Aug. 2002–Aug. 2004*
Topic: Design and Fatigue of a Structural Wood-Plastic Composite
- Designed, tested, and implemented wood-plastic composite bridge decking for pedestrian bridge structures and oversaw installation of a unique composite foundation/column connection

Community Research Project (MTU Undergraduate Research), *Dec. 2001–May 2002*
Topic: Eagle River Bridge Restoration Project
- Analyzed a closed 1909 truss bridge for design capacity and proposed retrofitting scheme

Grants Received

NSF 1049501: A Stochastic Phase-tracking Snow Micro-structure Model; P.I. Andrew E. Slaughter; National Science Foundation, Division of Earth Sciences Postdoctoral Fellowship Program; 2011; $170,000.

- The goal of the work is to research the use of stochastic finite element methods to model the evolution of the snow micro-structure including phase change within the snow. A model of this type would improve the current understanding of snow metamorphism by providing a means to monitor the evolution of the ice matrix within the snow while accounting for uncertainties in the system.

Academic/Teaching Experience

Adjunct Faculty and Instructor, MSU *Fall 2009; Fall 2010; Spring 2011*
Mechanics: Statics and Dynamics; Strength of Materials; Snow and Avalanche Physics for Science Teachers; Texts and Critics: Knowledge

- Instructed two undergraduate Civil Engineering Technology courses
- Developed and instructed a distance learning course for K–12 educators seeking a Masters of Science in Science Education degree that incorporates topics from snow formation, avalanche dynamics, and engineering
- Instructed an honors seminar in critical reading and analysis of fundamental texts in the humanities, arts, communication, social studies, science, and history of ideas

National Science Foundation (NSF) and Big Sky Institute Fellow, *July 2007–July 2009*
Graduate Teaching Fellow in K–12 Education (GK–12)

- Partnered with a 5th grade teacher to assist in expanding curriculum to foster excitement in science
- Developed a complete snow science curriculum

Research and Engineering Apprenticeship Program (REAP) Mentor, *Summers of 2006, 2007, and 2008*

- Mentored recent high school graduates in conducting research at MSU
- Guided students on projects researching snow micro-penitents and snow albedo

Teaching Assistant, MSU, *2004–2010*
Fluid Mechanics; Concrete Technology and Structures; Statics and Dynamics

- Held regular office hours, substitute lectured, taught laboratory sections, graded homework and exams

Broader Impacts and Outreach

- Assisted in the development of an interactive game for the *Science Storms* exhibit at the Museum of Science and Industry (Chicago, IL) that explores snow avalanches
- Involved in various local and regional news coverage regarding the research conducted at MSU (e.g., KTVM Montana)
- Implemented a presentation, "Is it Safe?", by 5^{th} grade students at the International Snow Science Workshop
  - Independently raised travel funds for the 5^{th} grade student presenters
  - Featured in various regional news outlets via the MSU News Service
- Appeared in the New York Times article *Solving Avalanches' Mysteries*
- Appeared on the Discovery Channel's program *Survive This, Smokey Bear Balloon Crash*

Computer and Technical Skills

Programming Languages and Skills: ▪ C++ ▪ MATLAB ▪ GNU Octave ▪ R ▪ Fortran ▪ Python ▪ FEniCS ▪ libMesh ▪ Parallel programing ▪ MPI ▪ PETSc ▪ Trilinos ▪ Cmake ▪ make ▪ Version Control Tools (Subversion, Mercurial, Git) ▪ MathCAD ▪ LabView ▪ LaTeX ▪ HTML ▪ Windows and Linux Operating Systems ▪ MS Office

Technical Skills: ▪ Environmental instrumentation ▪ Structural testing equipment ▪ Servo-hydraulic actuators ▪ Tool and wood working ▪ National Instruments and Agilent data loggers

Fellowships and Scholarships

- **National Science Foundation GK-12 Graduate Fellowship**, *Jul. 2007 and Jul. 2008*
- **B.E. Grant Memorial Scholarship**, *August 2007*
- **Inland Northwest Research Alliance Graduate Fellowship**, *Aug. 2005 and Aug. 2006*
- **Kenneth Tait Scholarship**, *Aug. 2005 and Aug. 2006*
- **American Avalanche Association Graduate Grant**, *Sept. 2005*
- **International Snow Science Workshop 2000 Graduate Grant**, *Sept. 2005*
- **Washington State University Graduate Scholarship**, *Jan. 2003*
- **Weyerhaeuser Graduate Fellowship**, *Aug. 2002*

Professional References

- **Nicholas Zabaras (please notify me before contacting)**, *Scientific Mentor*; 101 Frank H. T. Rhodes Hall, Cornell University, Ithaca, NY 14853; 607.225.9104; zabaras@cornell.edu
- **Edward Adams**, *PhD Advisor*; 205 Cobleigh Hall, Bozeman, MT 59717; 406.994.6122; eda@ce.montana.edu
- **Dan Miller**, *Postdoctoral Supervisor*; 205 Cobleigh Hall, Bozeman, MT 59717; 406.994.6118; dan.miller@ce.montana.edu
- **Michael Wolcott**, *MS Advisor*; Composite Materials and Engineering Center, PO Box 641806, Washington State University, Pullman, WA 99164-1806; 509.335.6392; wolcott@wsu.edu
- **Dave Neal**, *GK–12 Education Mentor*; Ophir School District No. 72, 45465 Gallatin Road, Gallatin Gateway, MT 59730; 406.995.4281; davetneal@gmail.com

Publications and Presentations

Peer-reviewed Journal Articles

[1] **A.E. Slaughter**, E.E. Adams, P.J. Staron, R.H. Shertzer, D.J. Walters, D. McCabe, D. Catherine, I. Henninger, T. Leonard, M. Cooperstein, and H. Munter. Field investigation of near-surface metamorphism of snow. *Journal of Glaciology*, 57(203):441–452, 2011.

[2] E.E. Adams, **A.E. Slaughter**, L.R. McKittrick, and D.A. Miller. Local terrain topography and thermal properties influence on energy and mass balance of a snowcover. *Annals of Glaciology*, A52(58):169–175, 2011.

[3] **A.E. Slaughter**, D. McCabe, H. Munter, P.J. Staron, E.E. Adams, D. Catherine, I. Henninger, M. Cooperstein, and T. Leonard. An investigation of radiation-recrystallization coupling laboratory and field studies. *Cold Regions Science and Technology*, 59(2–3):126–132, 2009.

[4] **A.E. Slaughter**, M.P. Wolcott, and D.I. McLean. Design of a wood-plastic composite bridge deck member. *Forest Products Journal*, accepted.

Articles in Review

[1] **A.E. Slaughter** and E.E. Adams. Methods for numerical exploration of snow metamorphism. *Journal of Applied Statistics*, in review.

[2] **A.E. Slaughter** and M.P. Wolcott. Static testing of structural polypropylene wood-plastic composites. *Wood and Fiber Science*, in review.

Proceedings and Presentations

[1] **A.E. Slaughter** and E.E. Adams. Field and analtyical examination of near-surface facets. In *International Snow Science Workshop*, Sqauw Valley, CA, 2010.

[2] E.E. Adams, **A.E. Slaughter**, L. McKittrick, and D.A. Miller. The coupling of snow near surface metamorphism and surface energy balance in complex alpine terrain. In *International Symposium on snow, ice and humaity in a changing climate*, Sapporo, JP, 2010.

[3] **A.E. Slaughter** and E.E. Adams. Numerical investigation of factors causing near-surface metamorphism. In *International Snow Science Workshop*, Davos, CH, 2009.

[4] E. Adams, L McKittrick, **A.E. Slaughter**, P. Staron, R. Shertzer, D. Miller, T. Leonard, D. McCabe, I. Henninger, D. Catharine, M. Cooperstein, and K. Laveck. Modeling variation of surface hoar and radiation recrystallization across a slope. In *International Snow Science Workshop*, Davos, CH, 2009.

[5] **A.E. Slaughter** and E.E. Adams. Importance and interaction of the energy balance components governing radiation-recrystallization of snow. In *Lessons from Continuity and Change in the Fourth International Polar Year*, 2009.

[6] Staron P.J., E.E. Adams, and **A.E. Slaughter**. Modeling and measuring albedo due to near-surface metamorphism. In *Lessons from Continuity and Change in the Fourth International Polar Year*, 2009.

[7] **A.E. Slaughter**, P.J. Staron, E.E. Adams, D. McCabe, H. Munter, D. Catherine, I. Henninger, M. Cooperstein, and T. Leonard. Laboratory simulations of radiation-recrystallization events in Southwest Montana. In *International Snow Science Workshop*, Whistler, BC, 2008.

[8] **A.E. Slaughter**, D.T. Neal, and Ophir School 2007/2008 Fifth Grade. Snow science as curriculum in a fifth grade classroom. In *International Snow Science Workshop*, Whistler, B.C., 2008.

[9] Ophir School 2007/2008 Fifth Grade, **A.E. Slaughter**, and D.T. Neal. Is it safe? An educational poster developed by grade school students for their peers. In *International Snow Science Workshop*, Whistler, B.C., 2008.

[10] D. McCabe, H. Munter, D. Catherine, I. Henninger, M. Cooperstein, T. Leonard, **A.E. Slaughter**, P.J. Staron, and E.E. Adams. Near-surface faceting on south aspects in Southwest Montana. In *International Snow Science Workshop*, pages 147–154, Whistler, B.C., 2008.

[11] **A.E. Slaughter**, E.E. Adams, T. Weas, and M. Hanson. Growth of snow mirco-penitents under controlled laboratory conditions. In *Environmental and Subsurface Science Symposium*, Moscow, ID, 2006.

[12] J.M. Staples, E.E. Adams, **A.E. Slaughter**, and L.R. McKittrick. Slope scale modeling of snow surface temperature in topographically complex terrain. In *International Snow Science Workshop*, pages 806–814, Telluride, CO, 2006.

[13] **A.E. Slaughter**, M.P. Wolcott, and D. McLean. Design of a wood-plastic composite deck board. In *Transportation Research Board 84th Annual Meeting*, 2005.