

BIOGRAPHICAL SKETCH

| NAME Brannon, Rebecca Moss | | POSITION TITLE Associate Professor of Mechanical Engineering | |
|-------------------------------|----------------------------------|---|---|
| EDUCATION/TRAINING | | | |
| INSTITUTION AND LOCATION | DEGREE <i>(if applicable)</i> | YEAR(s) | FIELD OF STUDY |
| University of Wisconsin | Ph.D. | 1992 | Impact and fracture mechanics |
| University of Wisconsin | M.S. | 1988 | Engineering mechanics |
| University of New Mexico | B.S. | 1987 | Mechanical engineering with computational physics internships |

A. Positions and Honors

Positions and Employment

2007- Associate professor of mechanical engineering, University of Utah, Salt Lake City, UT
 2003-2006 Principal engineer, ceramics fragmentation and geomechanics, Sandia National Laboratories, Albuquerque, NM
 2001-2003 Department manager, materials mechanics, Sandia National Laboratories, Albuquerque, NM
 1993-2002 Senior staff engineer in computational materials modeling under impact loading, Sandia National Laboratories, Albuquerque, NM
 1998-2003 Instructor (continuum and damage mechanics), University of New Mexico, Albuquerque, NM
 1996-2001 Instructor, State of New Mexico and Motorcycle Safety Foundation, Albuquerque, NM
 1985-1988 FEA analyst and visualization engineer, Los Alamos National Laboratories, Los Alamos, NM
 1984-1985 FEA analyst, Kirtland Air Force Research Laboratory, Albuquerque, NM

Other Experience and Professional Memberships

1999, 2001, 2003, 2007 Technical Program Conference Organizer, APS SCCM (Portland/Atlanta/Snowbird), ASME McMat (Austin), USNCCM (San Francisco), Int. Conf. Plasticity (Hawaii)
 2001- ASME/ABET university accreditor
 1995- Member American Physical Society (Shock Physics)
 1994- Reviewer for Int. J. Plasticity, Int. J. Numer. Anal. Meth. in Geomechanics, Acta Mechanica, J. Mech. Phys. Solids, IJNAMG
 1984- Member American Society of Mechanical Engineers

Selected Honors

2007 Plenary Speaker, Hypervelocity Impact Symposium, Williamsburg VA (A survey of tenuous assumptions in high-rate fracture and failure)
 2006 Award for excellence: Fragmentation Analysis of Ceramic Armor
 2005 Award for excellence: documentation and testing of Sandia's GeoModel software
 2004 Distinguished lecturer, UCSD
 2000 Award for excellence: modeling of shock-induced polarization of ferroelectric ceramics

B. Selected peer-reviewed publications (in chronological order).

1. Brannon RM, Drugan WJ. Influence of nonclassical elastic-plastic constitutive features on shock wave existence and spectral solutions. *J. Mech. Phys. Solids* Vol. 41, No 2, 1993: 297-330.
2. Brannon RM, Drugan, WJ, Shen Y. Requirements of thermodynamics in the analysis of elastic-plastic shock waves. *J. Mech. Phys. Solids*. 1995; 43(6): 973-1001.
3. Tikare V, Aidun JB, Brannon RM. Simulations of the stress response of a porous polycrystalline material under transient dynamic loading. Pacific Coast Meeting of the American Ceramic Society, Oct. 12-15, 1997, San Francisco, CA. 1997.
4. Brannon RM. Large deformation analysis of axisymmetric inhomogeneities including coupled elastic and plastic anisotropy, in: *Advances in Computational Engineering Science*, Ed. S. N. Atluri and G. Yagawa, 1997; 1192-1201.
5. Chhabildas LC, Brannon RM. Shock-induced vaporization of zinc: Experiment and numerical simulations. *Chemical Physics Reports*. 1998; 17: 203-213.
6. Brannon RM. Caveats concerning conjugate stress and strain measures for frame indifferent anisotropic elasticity. *Acta Mechanica*. 1998; 129: 107-116.
7. Brannon RM, A consistent kinetics porosity (CKP) model. *Shock Compression of Condensed Matter - 1999*, eds. M.D. Furnish, L.C. Chhabildas, and R.S. Hixson. American Institute of Physics publication no. 1-56396-293-8. 2000
8. Brannon RM, Montgomery ST, Aidun JB, Robinson AC. Macro- and Meso-scale Modeling of PZT Ferroelectric Ceramics. *Shock Compression of Condensed Matter - 2001*, edited by M.D. Furnish, N.N. Thadhani, and Y. Horie, American Institute of Physics 0-7354-0068-7/02. 2002.
9. Chen ZW, Shen HL, Brannon RM. An Evaluation of the Material Point Method. *Engineering Fracture Mechanics*, 2002; 69(17): 1873-90.
10. Coblenz D, Brannon RM, Fredrich, J, Rogers DH, Crossno P Imaging Salt-Induced Stress Perturbations with a Tensor Visualization Algorithm Based on the Mohr Diagram: G-cubed (online rapid electronics communications journal); 2003.
11. Lee MY, Brannon RM, Bronowski DR. Uniaxial and Triaxial Compression Tests of Silicon Carbide Ceramics under Quasi-static Loading Condition, Sandia National Laboratories Report 2004-6005.
12. Fossum, A. F. and R. M. Brannon Unified Compaction/Dilation, Strain-Rate Sensitive, Constitutive Model for Rock Mechanics Structural Analysis Applications. *ARMA/NARMS*. 2004; 04-546.
13. Brannon RM. The influence of uncertainty in crack or slip plane orientations on cracking or localization probabilities. American Society of Civil Engineers (ASCE) Joint Specialty Conf. on Probabilistic Mechanics and Structural Reliability, Albuquerque, NM. 2004
14. Wilson AT, Brannon RM. Exploring 2D Tensor Fields Using Stress Nets. *IEEE Visualization 2005*, IEEE Computer Society Press, Minneapolis, Minnesota, 2005; 11-17.
15. Fossum AF, Brannon RM. On a viscoplastic model for rocks with mechanism-dependent characteristic times, *ActaGeotechnica*. 2007: 1: 89-106.
16. Brannon RM. Elements of Phenomenological Plasticity: geometrical insight, computational algorithms, and applications in shock physics. . *Shock Wave Science and Technology Reference Library: Solids I*, Springer-Berlin, Heidelberg, New York. 2007; 2: 225-274.
17. Brannon RM, Wells JM, Strack OE. Validating theories for brittle damage <and> Advances in X-ray computed tomography diagnostics of ballistic impact damage *Metallurgical and Materials Transactions A*, doi:10.1007/s11661-007-9310-7, ISSN: 1073-5623 (Print). 2007

C. Research Support

Ongoing Research Support

Brannon (PI) 4/2007-12/2007

DoD

Numerical optimization of ceramic damage models

This study focuses on the development of new integration algorithms for statistical damage models

Role: PI

Brannon (PI) 4/2007-9/2008

DOE

Admissibility of nonassociative plasticity

This laboratory and computational study subjects apparently nonassociative metals and ceramics to changes in loading direction to possibly invalidate the traditional assumption of regular flow rules and thereby eliminate instabilities in existing plasticity models.

Role: PI

Completed Research Support

Chhabildas (PI) 1/1993-9/1993

DOE

Extension of the equation of state for zinc

The goal of this project was to analyze hypervelocity impact data for shock-induced vaporization of zinc

Role: Co-Investigator

Brannon (PI) 10/1993-9/1995

DoD

Development of constitutive models for aluminum oxide ceramics

The goal of this project was to incorporate anisotropic cracking damage into a constitutive model in Eulerian simulations

Role: Investigator

Montgomery/Aidun (co-PIs) 10/1997-6/2001

DOE

Multiscale constitutive models for ferroelectric ceramics

The goal of this project was to develop a single constitutive model capable of spanning from micro to macro scales for deformation-induced depolarization of PZT ceramics

Role: Co-Investigator

Fossum (PI) 10/2006-9/2000

DOE

Constitutive models for high rate deformation of porous and cracked rock

The goal of this project was to generalize conventional cap plasticity models for rock to be applicable in high-rate shock loading at laboratory and field scales

Role: Co-Investigator

Brannon (PI) 1/2003-10/2006

DoD

Constitutive models for fracture and fragmentation of ceramic armor

The goal of this project was to develop a practical constitutive model for modeling damage of armor ceramics

Role: Investigator