Deborah L. Sulsky

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Educational History:
Undergraduate Institution: Binghamton University, Mathematical Physics, B.S., 1977
Graduate Institution: Courant Institute of Mathematical Sciences, Mathematics, M.S. 1979, Ph.D., 1982 "Models of Cell and Tissue Movements" Advisors: Stephen Childress and Jerome Percus
Postdoctoral Institution: Massachusetts Institute of Technology, Applied Mathematics, 1982–1984

Employment History:
1998–present, Professor, Department of Mathematics and Statistics, UNM
1998–present, Professor, Department of Mechanical Engineering, UNM
2014–2015, Visiting Professor, Applied Mathematics, University of Washington
2000–2001, Visiting Research Associate, Aeronautics, Caltech
1992–1998, Associate Professor, Department of Mathematics and Statistics, UNM
1997–1998, Associate Professor, Department of Mechanical Engineering, UNM
1987–1992, Assistant Professor, Department of Mathematics and Statistics, UNM
1984–1987, Adjunct Assistant Professor, Department of Mathematics, UCLA
1982–1984, Instructor, Applied Mathematics, MIT

Consulting Experience: *1988-2000*, Los Alamos National Laboratory

Academic Honors:
New York State Regents Scholarship 1973-1977
Phi Beta Kappa 1977
Sigma Pi Sigma 1977
Exxon Research Fellowship June-July 1983
Exxon Research Fellowship June-July 1984
A & S Research Semester Fall, 1995

Professional Affiliations:
American Mathematical Society
Society for Industrial and Applied Mathematics
US Association for Computational Mechanics

Research Interests: Scientific Computing, Fluid Dynamics, Solid Mechanics, Biomathematics, Multiphase Flow, Numerical Analysis

Selected Publications:

D. Sulsky and Ming Gong, *Improving the Material Point Method*, Eds.: K. Weinberg and A. Pandolfi, Lecture Notes in Applied and Computational Mechanics, Springer, **81**:217-240 (2016)

H.L. Schreyer and D.L. Sulsky, *Constitutive and numerical framework for modeling joints and faults in rock*, Int. J. Num. Anal. Meths. Geomechs. (2015) DOI: 10.1002/nag.2482.

Han D. Tran, Deborah L. Sulsky and Howard L. Schreyer *An Anisotropic Elastic-Decohesive Constitutive Relation for Sea Ice*, Int. J. Num. Anal. Meths. Geomechs., **39**(9):988-1013 (2015) doi:10.1002/nag.2354.

J. Sanchez, H. Schreyer, D. Sulsky, and P. Wallstedt *Solving Quasi-Static Equations with the Material-Point Method*, Int. J. Numer. Meths. Eng., **103**(1):60-78 (2015).

L. Xu, H. Schreyer and D. Sulsky *Blast Induced Rock Fracture Near a Tunnel*, International Journal for Numerical and Analytical Methods in Geomechanics, **39**:23-50 (2015) DOI: 10.1002/nag.2294.

Pedro J. Madrid, Deborah Sulsky and Ricardo A. Lebensohn *Uncertainty Quantification in Prediction of the In-Plane Young's Modulus of Thin Films with Fiber Texture*, IEEE/ASME Journal of Microelectromechanical Systems, **23**(2):380-390 (2014).

O. Guba, J. Lorenz and D. Sulsky *On Well-posedness of the viscous-plastic sea ice rheology*, J. Physical Oceanography, **43**(10):2194-2209 (2013).

K. Peterson and D. Sulsky, *Towards a New Elastic-Decohesive Model of Arctic Sea Ice*, Physica D, doi:10.1016/j.physletb.2003.10.071 (2012).

K. Peterson, H. Schreyer and D. Sulsky, *Decohesion with Refreezing*, Cold Reg. Sci. Technol., doi:10.1016/j.coldregions.2011.08.002 **76-77**:44-51 (2012)

Ron Kwok and Deborah Sulsky *Arctic Ocean sea ice thickness and kinematics: Satellite observations and modeling*, Oceanography, **23**(4):84-93 (2010)

D. Sulsky, H. Schreyer, K. Peterson, M. Coon and R. Kwok, *Using the Material-Point Method to Model Sea Ice Dynamics*, J. Geophys. Res., **112**: C02S90, doi:10.1029/2005JC003329 (2007).

Max Coon, Ron Kwok, Gad Levy, Matt Pruis, Howard Schreyer, and Deborah Sulsky, *Arctic Ice Dynamics Joint Experiment (AIDJEX) Assumptions Revisited and Found Inadequate*, Journal of Geophysical Research, **112**:C11S90, doi:10.1029/2005JC003393 (2007).

Michael A. Gilchrist, Deborah L. Sulsky, and Anne Pringle, *Identifying Fitness and Optimal Life-History Strategies for an Asexual Filamentous Fungus*, Evolution, **60**(5):970-979 (2006).

H.L. Schreyer, L.B. Munday, D.L. Sulsky, M.D. Coon and R. Kwok, *Elastic-Decohesive Constitutive Model for Sea Ice*, Journal of Geophysical Research, **111**:C11S26 doi 10.1029/2005JC003334 (2006).

E. Love and D. L. Sulsky, *An Unconditionally Stable, Energy-Momentum Consistent Implementation of the Material-Point Method*, Comput. Meths. Appld. Mechs. Engrg., **195**:3903-3925 (2006).

D. Sulsky and A. Kaul, *The Material-Point Method with Implicit Dynamics*, Comput. Meths. Appld. Mechs. Engrg., **193**(12-14):1137-1170 (2004).

Adrian Lew, Patrizio Neff, Deborah Sulsky, and Michael Ortiz, *Optimal BV Estimates for a Discontinuous Galerkin Method in Linear Elasticity*, AMRX, 2004, No. 3, 73-106.

H.L. Schreyer, D.L. Sulsky, and S.-J. Zhou, *Modeling Delamination as a Strong Discontinuity with the Material Point Method*, Comput. Meths. Applied Mechs. Engrng., **191**:2463-2481 (2002).

Gary Ayton, Scott Bardenhagen, Partick McMurtry, Deborah Sulsky, and Gregory A. Voth, *Interfacing Molecular Dynamics with Continuum Dynamics in Computer Simulation: Towards an Application to Biological Membranes*, IBM J. Res. & Dev., **45**:417-426 (2001).

Gary Ayton, Scott Bardenhagen, Partick McMurtry, Deborah Sulsky, and Gregory A. Voth, *Interfacing Continuum and Molecular Dynamics: An Application to Lipid Bilayers*, J. Chem. Phys., **114**:6913-6924 (2001).

S. Bardenhagen, J. Brackbill and D. Sulsky, *A Numerical Study of Stress Distribution in Sheared Granular Material in Two Dimensions*, Phys. Rev. E, **62**, 3882-3890 (2000).

X. Li and D. Sulsky *A Parallel Material-Point Method with Application to Solid Mechanics*, (2000) In: Applications of High-Performance Computing in Engineering VI, M. Ingber, H. Power, C.A. Brebbia, Eds., WIT Press, Southampton, Boston.

A.R. York, D. Sulsky and H. Schreyer, *Fluid-Membrane Interaction Based on the Material Point Method*, Int. J. Num. Meths. Engrg., **48**, 901-924 (2000).

S. Bardenhagen, J. Brackbill and D. Sulsky, *The Material-Point Method for Granular Materials*, Comput. Meths. Appld. Mechs. Engrng., **187**, 529-541 (2000).

A.R. York, D. Sulsky and H. Schreyer, *The Material Point Method for Simulation of Thin Membranes*, Int. J. Num. Meths. Engng., **44**, 1429-1456 (1999).

D. Sulsky and H. L. Schreyer, *Axisymmetric Form of the Material Point Method with Applications to Upsetting and Taylor Impact Problems*, Comput. Meth. Appl. Mech. Engrg., **139**, 409-429 (1996).

Deborah Sulsky, Shi-Jian Zhou, and Howard L. Schreyer, *Application of a Particle-in-Cell Method to Solid Mechanics*, Comput. Phys. Commun., **87**, 236-252 (1995).

Deborah Sulsky, *Numerical Solution of Structured Population Models II. Mass-Structure,* J. Math. Biol., **32**, 491-514 (1994).

Thomas Robey and Deborah Sulsky, *Row Ordering for a Sparse QR Decomposition,* SIAM J. Matrix Anal. Appl., **15**, 1208-1225 (1994).

D. Sulsky, Z. Chen, H. L. Schreyer, *A Particle Method for History-Dependent Materials*, Comput. Meth. Appl. Mech. Engrg., **118**, 179-196 (1994).

Deborah Sulsky, *Numerical Solution of Structured Population Models I. Age-Structure,* J. Math. Biol., **31**, 817-839 (1993).

D. Burgess, D. Sulsky and J. U. Brackbill, *Mass Matrix Formulation of the FLIP Particle-in-Cell Method*, J. Comput. Phys., **103**, 1-15 (1992).

Deborah Sulsky and J. U. Brackbill, *A Numerical Method for Suspension Flow,* J. Comput. Phys., **96**, 339-368 (1991).

Richard R. Vance, William I. Newman and Deborah Sulsky, *The Demographic Meanings of the Classical Population Growth Models of Ecology,* Theor. Pop. Biol., **33**, 199-225 (1988).

D. Sulsky, S. Childress and J. K. Percus, *A Model of Cell Sorting,* J. Theor. Biol., **106**, 275-301 (1984).

Mentorship:
Directed 7 Ph.D. students, 6 M.S. students, 7 undergraduate research projects, 3 post-degree CSE certificates; served on Committee on Studies for 38 other Ph.D. and M.S. students in 7 departments.

Editorship:
Member, Editorial Board, Computational Particle Mechanics, Sept. 2018 - present.
Member, Editorial Board, Cold Regions Science and Technology, Sept. 2011 - present.
Associate Editor, Expository Research Section of SIAM Review, Jan. 2010-2013.

Selected Professional Service:
Helped establish CSE Graduate Certificate, interdisciplinary training in high-performance computing for students in 11 participating departments - Chair of Program Committee, 1995-6, and A&S Coordinator, 1997-2000. Organizer, AMS Mathematical Research Community, Sea Ice, Partial Differential Equations and Probability, Snowbird, Utah, June 21-26, 2015. Organizer, Minisymposium, 'Recent Advances in Galerkin and Collocation Meshfree Methods', 12th WCCM, Seoul, Korea, 24-29 July 2016. Organizer, Minisymposium, 'The Material-Point Method, Theory and Applications,' for an Invited Session at PARTICLES 2013, Stuttgart, Germany, An ECCOMAS Thematic Conference, and an IACM Special Interest Conference. Organizer of 6th Material-Point Method Workshop, Albuquerque, 2010. Organizer, Minisymposium on Polar Climate Modeling, Annual Joint Mathematics Meetings, in Washington D.C, 2009. Organizer, Minisymposium on the Material-Point Method at the SIAM Annual Meeting, 2005. Member, Committee on Meshfree Methods, USACM, January, 2001-present, Vice-Chair 2007-9, Chair 2009-13. Member, USACM Novel Methods in Computational Engineering & Sciences Technical Thrust Area, May, 2015-2017.

Recent Invited Lectures:
Modeling Arctic Sea Ice, D. Sulsky, SIAM Conference on Mathematical and Computational Issues in the Geosciences, Stanford University, Palo Alto, CA, June 29 - July 1, 2015. *Improving MPM* D. Sulsky and Ming Gong, US National Congress on Computational Mechanics, San Diego, CA, July 26-30, 2015. *Connections between the Material-Point Method and other Meshfree Methods*, D. Sulsky and Ming Gong, Eighth International Workshop on Meshfree Methods for Partial Differential Equations, Bonn, Germany, September 7-9, 2015. *Anisotropic, Elastic-Decohesive Constitutive Relation for Modeling Sea Ice*, Workshop, Sea-Ice mechanical modeling: from physics to applied mathematics, Univ of Grenoble, France, June 2014. *Convergence and Accuracy of the Material-Point Method*, IUTAM Symp, Innovative numerical approaches for materials and structures in multi-field and multi-scale problems, Burg Schnellenberg, Germany, Sept 2014.