

Brittany A. Erickson

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Department of Computer and Information Science
1202 University of Oregon
Eugene, OR 97403

Education

Ph.D. Mathematics, University of California, Santa Barbara.
Emphasis: Computational Science and Engineering, 2010.

M.A. Applied Mathematics, University of California, Santa Barbara, 2006.

B.S. Mathematical Science, University of California, Santa Barbara, 2004.

Employment

Assistant Professor. December 2018 - present.
Department of Computer and Information Science, University of Oregon.
Department of Earth Sciences, University of Oregon.

Assistant Professor. September 2014 - December 2018.
Department of Mathematics and Statistics, Portland State University.

Postdoctoral Scholar. January 2013 - September 2014.
Department of Geological Sciences, San Diego State University.

National Science Foundation Postdoctoral Fellow. September 2010 - January 2013.
Department of Geophysics, Stanford University.

Grants and Fellowships

NSF Research Grant “Collaborative Research: Exploring System-Wide Events in Complex Fault Networks using Fully-Dynamic 3D Earthquake Cycle Simulations.” EAR-2053372. Aug 2021 - July 2024. (Principal Investigator)

NSF Research Grant “Fluid Oscillations in Conduit-reservoir Systems, Very Long Period Seismic Signals at Kilauea Volcano, and the Phenomenology of Unsteady Magma Ascent.” EAR-2036980. March 2021 - March 2023. (Co-principal Investigator)

SCEC Research Grants “Advancing Simulations of Sequences of Earthquakes and Aseismic Slip (SEAS).” #21065, #20113, #19109, #18099. Feb 2018 - Jan 2022. (Principal Investigator)

SCEC Research Grants “Workshop for Advancing Simulations of Sequences of Earthquakes and Aseismic Slip (SEAS).” #21139, #20120, #19110, #198102. Feb 2018 - Jan 2022. (Principal Investigator)

SCEC Research Grant “A Joint Workshop: Rupture Dynamics Code Validation and Comparing Simulations of Earthquake Sequences and Aseismic Slip.” #17151. Feb 2017 - May 2018. (Co-principal Investigator)

NSF Research Grant “Collaborative Research: From Loading to Rupture - How do Fault Geometry and Material Heterogeneity Affect the Earthquake Cycle?” EAR-1547603. Mar 2016 - Feb 2020. (Principal Investigator)

SCEC Research Grant “The Effects of Plasticity and the Evolution of Damage Zones in Earthquake Cycle Simulations”. #15116. Feb 2014 - Jan 2015. (Co-principal Investigator)

Travel Grant, Portland State University, 2014.

SCEC Research Grant “The Influence of Fault Roughness and Damage Zones in 3D Earthquake Cycle Simulations.” #14083. Feb 2013 - Jan 2014. (Co-principal Investigator)

Travel Grant, Association for Women in Mathematics, 2012.

NSF Postdoctoral Fellowship Research Grant “Single Event and Long Term Dynamics of Nonplanar Fault Systems.” EAR-0948304 Sep 2010 - Aug 2012.

Refereed Publications

Kozdon, J. E., Erickson, B. A., and Harvey, T. (2021), A non-stiff summation-by-parts finite difference method for the wave equation in second order form: Characteristic boundary conditions and nonlinear interfaces, submitted to the *Journal of Scientific Computing*.

Kozdon, J. E., Erickson, B. A., and Wilcox, L. C. (2021), Hybridized summation-by-parts finite difference methods, *Journal of Scientific Computing*, 87, doi: 10.1007/s10915-021-01448-5.

Schumacher, T., Hameed, A. W, Higgins, C. and Erickson B. A. (2021), Characterization of hydrodynamic properties from free vibration tests of a large-scale bridge model, *Journal of Fluids and Structures*, 106, doi:10.1016/j.jfluidstructs.2021.103368.

Erickson, B. A., Jiang, J., Barall, M., Lapusta, N., Dunham, E. M., Harris, R., Abrahams, L. S., Allison, K. L., Ampuero, J. P., Barbot, S., Cattania, C., Elbanna, A., Fialko, Y., Idini, B., Kozdon, J. E., Lambert, V., Liu, Y., Luo, Y., Ma, X., Mckay, M. B., Segall, P., Shi, P., van den Ende, M., Wei, M. (2020), The community code verification exercise for simulating Sequences of Earthquakes and Aseismic Slip (SEAS), *Seismological Research Letters*, 91, p. 874–890, doi: 10.1785/0220190248.

Erickson, B. A., O’Reilly, O. and Nordström, J. (2019), Accuracy of stable, high-order finite difference methods for hyperbolic systems with non-smooth wave speeds, *Journal of Scientific Computing*, 81, p. 2356–2387, doi: 10.1007/s10915-019-01088-w.

Mckay, M. B., Erickson, B. A. and Kozdon, J. E. (2019), A computational method for earthquake cycles within anisotropic media, *Geophysical Journal International*, 219, p. 816–833, doi: 10.1093/gji/ggz320.

Erickson, B. A., Dunham, E. M. and Khosravifar, A. (2017), A finite difference method for off-fault plasticity throughout the earthquake cycle, *Journal of the Mechanics and Physics of Solids*, 109, p. 50–77, doi: <https://doi.org/10.1016/j.jmps.2017.08.002>.

Erickson, B. A. and Day, S. M. (2016), Bimaterial effects in an earthquake cycle model using rate-and-state friction, *Journal of Geophysical Research, Solid Earth*, 121, p. 1–26, doi: 10.1002/2015JB012470.

Erickson, B. A. and Nordström, J. (2014), Stable, high order accurate adaptive schemes for long time, highly intermittent geophysics problems, *Journal of Computational and Applied Mathematics*, 271, p. 328–338, doi: <https://doi.org/10.1016/j.cam.2014.04.019>.

Sleep, N. H. and Erickson, B. A. (2014), Nonlinear attenuation of S-waves and Love waves within ambient rock, *Geochemistry, Geophysics, Geosystems*, p. 1–21, doi:10.1002/2014GC005250.

Erickson, B. A. and Dunham E. M. (2014), An efficient numerical method for earthquake cycles in heterogeneous media: Alternating sub-basin and surface-rupturing events on faults crossing a sedimentary basin, *Journal of Geophysical Research*, p. 1–26, doi:10.1002/2013JB010614.

Nordström, J., Abbas, Q., Erickson, B. A. and Frenander, H. (2013), A flexible boundary procedure for hyperbolic problems: Multiple penalty terms applied in a domain, *Communications in Computational Physics*, p. 541–570, doi: 10.4208/cicp.020313.120314a.

Erickson, B. A., Birnir B., and Lavallée, D. (2011), Periodicity, chaos and localization in a Burridge-Knopoff model of an earthquake with rate-and-state friction, *Geophysical Journal International*, 187, p. 178–198, doi: <https://doi.org/10.1111/j.1365-246X.2011.05123.x>.

Erickson, B. A., Birnir B., and Lavallée, D. (2008), A model for aperiodicity in earthquakes, *Nonlinear Processes Geophysics*, 15, p. 1–12, doi: 10.5194/npg-15-1-2008.

Selected Presentations at Recent Professional Meetings

Erickson, B. A. et al. (2021), “Community Code Verification Exercises for Simulations of Earthquake Sequences and Aseismic Slip (SEAS): Dynamic Effects and Dipping Fault Geometries”, poster 145 presented at the SCEC annual meeting, Palm Springs, CA.

Erickson, B. A. (2019), “Convergence of High-order Accurate SBP-SAT methods for Hyperbolic Systems with Non-smooth Wave Speeds”, presented in the Applied Mathematics and Computation Seminar at Oregon State University, Corvallis, OR.

Jiang, J., and B. A. Erickson (2018), “Advancing Simulations of Sequences of Earthquakes and Aseismic Slip (SEAS)”, invited (plenary) talk presented at the SCEC annual meeting, Palm Springs, CA.

Erickson, B. A. (2018), “A Linearized Stability Analysis of Acoustic-Gravity Waves in a Volcanic Conduit with a Spatially Variable Background State”, talk presented at the SIAM annual meeting, Portland OR.

Erickson, B. A. (2018), “Do waves drive conduit flow instabilities during explosive volcanic eruptions?” talk presented at the Cascade Rain Mathematics Meeting, Portland OR.

Best McKay, M. and Erickson, B. A. (2017), “Incorporating Anisotropic Material Properties into Simulations of the Earthquake Cycle”, presented at the SCEC Annual Meeting, Palm Springs, CA.

Erickson, B. A. (2017), “Modeling the Earthquake Cycle with Heterogeneous Materials and Off-fault Plasticity”, invited talk at the U.S. Geological Survey, Menlo Park, CA.

Erickson, B. A. (2016), “Integration Algorithms and Finite Difference Methods for Plastic Deformation”, talk presented at the Cascade Rain Mathematics Meeting, Portland OR.

Student Advising and Teaching Appointments

MS students advised and graduated from PSU: Craig Daniels, Nicholas Fusaro, Cody Rucker, Maricela Best Mckay, Urszula Krzywda.

Current PhD students at UO: Alexandre Chen, Tobias Harvey, Cody Rucker.

Instructor at the University of Oregon (2018-present)

- Graduate Level Courses:
 - MATH 421/521 Partial Differential Equations and Fourier Theory
 - CIS 607 GPU programming for Scientific Computing¹
 - CIS 607 Computational Methods for Partial Differential Equations¹
 - CIS 607 MPI and Scientific Computing¹
 - CIS 410/510 Computational Science¹
- Undergraduate Level Courses
 - CIS 210 Introduction to Computer Science I
 - EARTH 363 Computational Tools

Instructor at Portland State University (2014-2018)

- Undergraduate Level Courses: Linear Algebra, Differential Equations
- Graduate Level Courses: Numerical Calculus, Theory of Ordinary Differential Equations, Advanced Linear Algebra, Advanced Numerical Analysis, An Introduction to Finite Difference Methods for Partial Differential Equations², Continuum Mechanics and Mathematical Modeling²

Instructor at University of California, Santa Barbara (2008-2010)

¹denotes a new course developed at University of Oregon

²denotes a new course developed at Portland State University

- Undergraduate Level Courses: Calculus with Applications, I and II, Mathematics for Elementary Teaching

Professional Development Activities

Co-leader for the SCEC working group for Advancing Simulations of Sequences of Earthquakes and Aseismic Slip (SEAS), with over 30 members from the scientific community <https://strike.scec.org/cvws/seas/>.

Co-organizer and leader for four SCEC workshops for “Advancing Simulations of Sequences of Earthquakes and Aseismic Slip (SEAS)”, involving over 30 participants from 5 different countries, 2018 - present.

Memberships in Professional Societies

Official member of the Society for Industrial and Applied Mathematics (SIAM) and the Southern California Earthquake Center (SCEC).