

ED BUELER

Associate Professor of Mathematics (Applied)
Department of Mathematics and Statistics
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ACADEMIC POSITIONS

Associate Professor, DMS, UAF August 2005–present.¹
Assistant Professor, DMS, UAF August 2000–May 2005.
Term and Visiting Assistant Professor, DMS, UAF August 1998–May 2000.
Postdoctoral Fellow, *Year in Stochastic Analysis*, Mathematical Sciences Research
Institute, Berkeley, August 1997–May 1998.

EDUCATION

Ph. D. Mathematics, Cornell University, Ithaca NY, 1997. (Advisor: Leonard Gross;
Thesis: *The heat kernel weighted Hodge Laplacian on noncompact manifolds*)
M. S. Mathematics, Cornell University, Ithaca NY, 1994.
B. S. Mathematics with Honors, Minor in Physics, Minor in Electrical Engineering,
California State University, Chico CA, 1991.

HONORS

Faculty Advising Award for Outstanding Undergraduate Advising, 2003-2004.
Honorary Faculty Certificate of Appreciation for support of a student-athlete, 2004.
Bonus for Extraordinary Performance, CSEM, 2003.

PUBLICATIONS

P12.² E. **Bueler** and J. Brown, 2009. *Shallow shelf approximation as a “sliding law” in a thermomechanically coupled ice sheet model*, Journal of Geophysical Research (Earth Surface) 114, F03008, doi:10.1029/2008JF001179.
P11. E. A. Butcher, M. Sari, E. **Bueler**, and T. Carlson, 2009. *Magnus’ expansion for time-periodic systems: parameter-dependent approximations*, Communications in Nonlinear Sciences and Numerical Simulation 14, 4226–4245.
P10. E. A. Butcher, O. A. Bobrenkov, E. **Bueler**, and P. Nindujarla, 2009. *Analysis of milling stability by the Chebyshev collocation method: Algorithm and optimal stable immersion levels*, Journal of Computational and Nonlinear Dynamics (ASME) 4 (3), 031003.

¹CV creation date: October 9, 2009

²Headings “**P**,” “**C**,” “**T**,” and “**G**” denote Published papers (peer-reviewed), Conference proceedings (peer or editor reviewed), Technical reports (un-reviewed), and funded Grants.

- P9.** V. Deshmukh, E. A. Butcher, and E. **Bueler**, 2008. *Dimensional reduction of nonlinear delay differential equations with periodic coefficients using Chebyshev spectral collocation*, *Nonlinear Dynamics* 52, 137–149.
- P8.** E. **Bueler**, 2007. *Error bounds for approximate eigenvalues of periodic-coefficient linear delay differential equations*, *SIAM Journal on Numerical Analysis* 45 (6), 2510–2536.
- P7.** E. **Bueler**, J. Brown, and C. Lingle, 2007. *Exact solutions to the thermomechanically coupled shallow ice approximation: effective tools for verification*, *Journal of Glaciology* 53 (182), 499–516.
- P6.** E. **Bueler**, C. S. Lingle, and J. A. Brown, 2007. *Fast computation of a viscoelastic deformable earth model for ice flow simulations*, *Annals of Glaciology* 46, 97–105.
- P5.** E. **Bueler**, C. S. Lingle, J. A. Kallen-Brown, D. N. Covey, and Latrice N. Bowman, 2005. *Exact solutions and the verification of numerical models for isothermal ice sheets*, *Journal of Glaciology* 51 (173), 291–306.
- P4.** E. A. Butcher, H. Ma, E. **Bueler**, V. Averina, and Z. Szabo, 2004. *Stability of time-periodic delay-differential equations via Chebyshev polynomials*, *International Journal on Numerical Methods in Engineering* 59 (7), 895–922.
- P3.** E. A. Butcher, H. Ma, and E. **Bueler**, 2003. *Chebyshev expansion of linear dynamic systems with time delay and periodic coefficients under control excitations*, *Journal of Dynamic Systems, Measurement and Control (ASME)* 125, 236–243.
- P2.** E. **Bueler** and I. Prokhorenkov, 2002. *Hodge theory and cohomology with compact supports*, *Soochow Journal of Mathematics* 28 (1), 33–55.
- P1.** E. **Bueler**, 1999. *The heat kernel weighted Hodge Laplacian on noncompact manifolds*, *Transactions of the American Mathematical Society* 351, 683–713.

CONFERENCE PROCEEDINGS

- C6.** W. Lipscomb, R. Bindschadler, E. **Bueler**, D. Holland, J. Johnson, and S. Price, *A Community Ice Sheet Model for Sea Level Prediction: Building a Next-Generation Community Ice Sheet Model, A Workshop Held at Los Alamos National Laboratory, Los Alamos, New Mexico, 18-20 August 2008*, Eos, Transactions, American Geophysical Union, 90 (3), 23.
- C5.** E. **Bueler**, *Lessons from the short history of ice sheet model intercomparison*, *The Cryosphere Discussions*, Vol. 2, 114, 2008.
- C4.** E. A. Butcher, V. Deshmukh, and E. **Bueler**, *Center manifold reduction of periodic delay differential systems*, *Proceedings of the ASME 2007 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2007*, Las Vegas, Nevada, September 2007.
- C3.** E. A. Butcher, P. Nindujarla and E. **Bueler**, *Stability of up- and down-milling using a Chebyshev collocation method*, *Proceedings of ASME IDETC/CIE 2005*, Long Beach, CA, September 2005.
- C2.** V. Averina and four others, *Effect of delay on engine air-to-fuel ratio control*, *Proceedings of the IEEE Conference on Control Applications*, Toronto, August 2005.
- C1.** E. A. Butcher and four others, *Stability analysis of parametrically excited systems with time-delay*, *Proceedings of 19th Biennial Conference on Mechanical Vibration and Noise*, ASME DETC 03, Chicago, IL (2003)

TECHNICAL REPORTS

- T12.** E. **Bueler** and J. Brown, *The shallow shelf approximation as a “sliding law” in a thermomechanically coupled ice sheet model*, [arXiv:0810.3449](#), 2008.
- T11.** E. **Bueler**, J. Brown, N. Shemonski, and C. Khroulev *PISM User’s Manual*, 88 pages, 2006-2009.
- T10.** E. **Bueler**, *An exact solution to the temperature equation in a column of ice and bedrock*, [arXiv:0710.1314](#), 2007.
- T9.** E. **Bueler** and J. Brown, *On exact solutions for cold, shallow, and thermocoupled ice sheets*, [arXiv:physics/0610106](#), 2006.
- T8.** E. **Bueler**, C. S. Lingle, and J. Brown, *Computation of combined spherical-elastic and viscous-half-space earth model for ice sheet simulation*, [arXiv:physics/0606074](#) (2006).
- T7.** E. **Bueler**, *Chebyshev collocation for linear, periodic ordinary and delay differential equations: a posteriori estimates*, [arXiv:math.NA/0409464](#) (2004).
- T6.** E. **Bueler**, C. S. Lingle, J. Brown, D. Covey, and L. N. Bowman, *Exact time-dependent similarity solutions for isothermal shallow ice sheets*, UAF DMS Tech. Rep. 04–01 (2004).
- T5.** E. **Bueler**, *Construction of steady state solutions for isothermal shallow ice sheets*, UAF DMS Tech. Rep. 03–02 (2003).
- T4.** E. **Bueler** and E. A. Butcher, *Stability of periodic linear delay–differential equations and the Chebyshev approximation of fundamental solutions*, UAF DMS Tech. 02–03 (2002).
- T3.** E. **Bueler**, *Numerical approximation of a two dimensional thermomechanical model for ice flow*, UAF DMS Tech. Rep. 02–02 (2002).
- T2.** E. **Bueler**, *Dirac operators as “annihilation operators” on Riemannian manifolds*, (2001).
- T1.** E. **Bueler**, *Number operators for Riemannian manifolds*, [arXiv:math-ph/0104022](#) (2000).

COMPUTER PROGRAMS

- cp2.** Parallel Ice Sheet Model (PISM); major authors E. **Bueler**, J. Brown, and C. Khroulev:
www.pism-docs.org
- cp1.** E. **Bueler**, DDEC: a suite of *Matlab* programs for creation of stability charts for linear periodic delay differential equations: www.dms.uaf.edu/~bueler/DDEcharts.htm

FUNDED RESEARCH GRANTS

- G3.** E. **Bueler** (PI), R. Hock (Co-I), D. Maxwell (Co-I), and M. Truffer (Co-I), *A high resolution Parallel Ice Sheet Model including fast, sliding flow: advanced development and application*, NASA Modeling Analysis and Prediction, grant #NNX09AJ38G, June 2009–June 2013. Award of \$1,009,510 over 4 years.
- G2.** C. Lingle (PI), D. Covey (Co-I), and E. **Bueler** (Co-I), *Ice Sheet Modeling: a component of NSF grant PRISM: Polar Radar for Ice Sheet Measurements* NASA Cryospheric Sciences Program grant # NAG5-11371, 10/01/2001 to 9/31/2006. Award of \$436,000 over 5 years.
- G1.** E. A. Butcher (PI) and E. **Bueler** (Co-PI), *Symbolic Stability and Bifurcation Analysis of Time-Periodic Differential-Delay Equations: Applications to High-Speed Machining Models*, NSF Civil and Mechanical Systems Directorate for Engineering # 0114500, 9/15/2001 to 8/31/2004. Award of \$205,000 over 3 years. Also \$5,014 supplemental for one REU student.

ADVISOR OF GRADUATE AND UNDERGRADUATE (RESEARCH) STUDENTS

- reu3.**³ Benjamin Sperisen, **ARSC Intern**, Subject: Numerical analysis of ice flow, and visualization, Summer 2008.
- reu2.** Nathan Shemonski, **ARSC Intern**, Subject: Modeling the Greenland ice sheet, Summer 2007.
- ms7.** Jacob Stroh, **M.S. Mathematics**, Thesis: *Non-normality in scalar delay differential equations*, UAF DMS, December 2006.
- ms6.** Jed A. Kallen-Brown, **M.S. Mathematics**, Project: *Multi-modal ice sheet dynamics: theory and implementation*, UAF DMS, August 2006.
- ms5.** Timothy Carlson, **M.S. Mathematics**, Thesis: *Magnus' expansion as an approximation tool for ODEs*, UAF DMS, May 2005.
- reu1.** Benjamin White, **NSF REU**, Subject: Delay differential equations, Summer 2004.
- ms4.** Latrice N. Bowman, **M.S. Mathematics**, Project: *Stability and accuracy of numerical finite difference methods applied to two dimensional isothermal ice flow*, UAF DMS, November 2002.
- ms3.** Viktoria A. Averina, **M.S. Mathematics**, Thesis: *Symbolic stability of delay differential equations*, UAF DMS, August 2002.
- ms2.** Mikhail Korotiaev, **M.S. Mathematics**, Thesis: *Critical Points of the heat kernel on a compact semisimple Lie group*, UAF DMS, August 2002.
- ms1.** Liane Hansen, **M.S. Mathematics**, Project: *Numerical solution of a weighted Hodge Laplacian*, UAF DMS, May 1999.

COURSES TAUGHT

At UAF: Undergraduate.

- Math 200 Calculus I (F99, F01, S06, S08, F08)
- Math 201 Calculus II (S99, S01, F03)
- Math 202 Calculus III (F98, F02)
- Math 215 Introduction to Mathematical Proofs (S02, cotaught with Faudree)
- Math 302 Differential Equations (S00, F00, S09)
- Math 310 Numerical Analysis (F98, F99, F00, F02, F04, F09)
- Math 314 Linear Algebra (S07)
- Math 412 Differential Geometry (S99, S03)
- Math 421 Applied Analysis (F01, F04, F07)
- Math 422 Introduction to Complex Analysis (S08)
- Math 490 Senior Seminar (S02, cotaught with Faudree)

At UAF: Graduate.

- Math 611 Mathematical Physics I (F05)
- Math 612 Mathematical Physics II (S06)
- Math 615 Applied Numerical Analysis (S00, S02, S05, S07)
- Math 630/694 Numerical Linear Algebra (F03, S09)
- Math 641 Real Analysis I (F00, F01)
- Math 692 Graduate Seminar in Random Walks (S01)

³Headings “**reu**” are for undergraduate research and “**ms**” for Master of Science students.

Math 692 Graduate Seminar in Differential Forms (F01, cotaught with Wiens)
Math 692 Graduate Seminar in Iterative Methods in Linear Algebra (F03)
Math 692 Graduate Seminar in Finite Elements (F04, cotaught with Maxwell)
Math 697 Individual Study in Functional Analysis (F02)

At Cornell University.

Math 111 Calculus I (S92, F93, S94)
Math 112 Calculus II (F92)

PROFESSIONAL ACTIVITIES

Member:

- American Mathematical Society (AMS)
- Society for Industrial and Applied Mathematics (SIAM)

Conference organizing, workshop teaching:

- Lecturer on *Numerical modelling of ice sheets and ice shelves*, Karthaus 2009 Summer School on Ice Sheets and Glaciers in the Climate System, September 2009
- Workshop on *Building a Next-Generation Community Ice Sheet Model* (co-organizer), Los Alamos, New Mexico, August 2008.
- Minisymposium on ice flow, SIAM Conference on Mathematical and Computational Issues in the Geosciences, Santa Fe, New Mexico, March 2007.

Refereeing and reviewing:

- Three U.S. NSF proposals (2001,2006,2009) and one Netherlands NSF proposal (2007).
- Articles for *The Cryosphere*, *Eur. J. Appl. Math.*, *J. Fluid Mech.*, *J. Glaciol.*, *J. Geophys. Res.*, *I. J. M. M. S.*, *Math. Models Methods Appl. Sci.*, *J. Dyn. Sys. Meas. Control*, *Nonlinear Dynamics*, and *Physica D*.
- 14 reviews for *Mathematical Reviews* from 1998 to 2005
- Numerical analysis texts for Addison-Wesley (two in 2000, one in 2001).