CURRICULUM VITAE AND PUBLICATION LIST

STEVEN RUUTH
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ACADEMIC POSITIONS

Professor, Department of Mathematics, SFU, Sept. 2009 - present.

Associate Professor, Department of Mathematics, SFU, Sept. 2005 - Aug 2009.

Assistant Professor, Department of Mathematics, SFU, Sept. 1999 - Aug. 2005.

Visiting Assistant Professor and NSERC Postdoctoral Fellow, Department of Mathematics, UCLA, Nov. 1996 - Aug. 1999.

EDUCATION

Ph.D. Applied Mathematics, University of British Columbia, 1996.

M.Sc. Applied Mathematics, University of British Columbia, 1993.

B.Math. Applied Mathematics & Computer Science, University of Waterloo, 1991.

HONORS

The Canadian Applied & Industrial Mathematics Society (CAIMS) Research Prize, 2020.

High-Profile Foreign Experts Visiting Programme, Ministry of Science & Tech of China, 2019.

Simons CRM Scholar-in-Residence Program, The Centre de Recherches Mathématiques, 2019.

OCCAM Visiting Fellowship, Oxford University, 2012.

Mathematical Science Research Visitors Program, Australia's National University, 2012.

The SIAM Germund Dahlquist Prize, 2011.

The Canadian Applied Mathematics Society Annual Doctoral Dissertation Award, 1997.

SELECTED SERVICE TO THE ACADEMIC COMMUNITY (2010-present)

Associate Editor, SIAM Journal on Scientific Computing, 2018-present.

Editorial Board, Applied Numerical Mathematics, 2017-present.

Board of Directors, CAIMS, 2014-2017.

External Reviewer, Computational Mathematics graduate program at the University of Waterloo, 2016.

SIAM Germund Dahlquist Prize Selection Committee, 2012-2013.

Local Site Director for PIMS, 2010-2011.

GRANT SUPPORT (selected)

Research Grant (principal investigator), Algorithms for continuum processes on complex, moving surfaces. $48,000 per year over 5 years funded by NSERC Canada, 2022-2027. This is my 6th NSERC Canada Discovery Grant (PI).

Research subaward for the UCLA project, Simulation of Thermonuclear Fusion from Cavitation in a Compressible Fluid: Role of the Bulk Modulus under Extreme Conditions. I'm the SFU subaward PI and Putterman (UCLA) is the project PI. The SFU subaward is US$41,208 over 18 months. Funded by AFOSR, July 2022 - Dec 2023.

Research Grant (co-investigator), Applied partial differential equations and pattern formation: stability, dynamics, bifurcations, and computation, $200,000 funded by the Pacific Institute of Mathematics (PIMS), 2015-2017. This was my 2nd PIMS Collaborative Research Grant.

Infrastructure Grant (with Borwein (PI) and 8 others), Interdisciplinary Research in the Mathematical and Computational Sciences (IRMACS). $11,736,918 funded primarily by the Canadian Foundation for Innovation (CFI) and the BC Knowledge Development Fund (BC KDF), 2002-2005.

Equipment Grant (with Schaeffer (PI) and 57 others), The Western Canada Research Computing Grid (WestGrid). $30,000,000 funded by CFI, BC KDF and other sources, 2002.

Equipment Grant (with Borwein (PI) and 8 others), HPC@SFU: A Modern Heterogeneous High Performance Parallel Computing Environment. $1,500,000 funded by CFI and BC KDF, 2001.

SELECTED PLENARY PRESENTATIONS (2011-2021)

The Annual Meeting of the Canadian Applied and Industrial Mathematics Society (CAIMS 2021), Waterloo, Canada (2021).

The 14th International Conference of Numerical Analysis and Applied Mathematics (ICNAAM 2016). Rhodes, Greece (Sept 19-25, 2016). This was my 3rd plenary presentation for ICNAAM.

International Conference on SCIentific Computation And Differential Equations (SciCADE 2011), Toronto (July 11 - 15, 2011).

GRADUATE STUDENT SUPERVISION (summary)

Senior supervisor for PhD student (Potgeiter) and MSc student (Venn). Co-supervisor for PhD student (King). Senior supervisor for 3 PhD graduates (Ong, Macdonald, Petras). Senior supervisor for 11 MSc graduates (Macdonald, Wang, Tian, Shahriari, Rockstroh, Zhong, Arteaga, King, Chow, May, Yazdani). Co-supervisor for 2 MSc graduates (Crestel, Zhang).

PUBLICATIONS: PDEs ON SURFACES (selected)

[1] May, Haynes, Ruuth. A closest point method library for PDEs on surfaces with parallel domain decomposition solvers and preconditioners. *Numer. Algorithms* (in press).

[2] Petras, Ling, Ruuth. Meshfree semi-Lagrangian methods for solving surface advection PDEs. *J. Sci Comput.* 93, 11 (2022).

[3] May, Haynes, Ruuth. Schwarz solvers and preconditioners for the closest point method. *SIAM J. Sci. Comput.*, 42(6): A3584-A3609, 2020.

[4] Petras, Ling, Piret, Ruuth. A least-squares implicit RBF-FD closest point method & applications to PDEs on moving surfaces. *J. Comput. Phys.*, 381: 146-161, 2019.

[5] Petras, Ling, Ruuth. An RBF-FD closest point method for solving PDEs on surfaces. *J. Comput. Phys.*, 370: 43-57, 2018.

[6] King, Ruuth. Solving variational problems and partial differential equations that map between manifolds via the closest point method. *J. Comput. Phys*, 336:330-346, 2017.

[7] Petras, Ruuth. PDEs on moving surfaces via the closest point method and a modified grid based particle method. *J. Comput. Phys.*, 312: 139-156, 2016.

[8] Rozada, Ruuth, Ward. The stability of localized spot patterns for the Brusselator on the sphere. *SIAM J. Appl. Dyn. Syst.*, 13(1): 564-627, 2014.

[9] Macdonald, Merriman, Ruuth. Simple computation of reaction-diffusion processes on point clouds., *Proc. Natl. Acad. Sci. USA*, 110(23): 9209-9214, 2013.

[10] Macdonald, Brandman, Ruuth. Solving eigenvalue problems on curved surfaces using the Closest Point Method. *J. Comput. Phys.*, 230(22): 7944-7956, 2011.

[11] Macdonald, Ruuth. The implicit Closest Point Method for solving partial differential equations on surfaces. *SIAM J. Sci. Comput.*, 31(6): 4330-4350, 2009.

[12] Ruuth, Merriman. A simple embedding method for solving partial differential equations on surfaces, *J. Comput. Phys.*, 227(3): 1943–1961, 2008.

PUBLICATIONS: INTERFACIAL DYNAMICS (selected)

[13] Esedoglu, Ruuth, Tsai. Diffusion generated motion using signed distance functions. *J. Comput. Phys.*, 229(4): 1017-1042, 2010.

[14] Esedoglu, Ruuth, Tsai. Threshold dynamics for high order geometric motions, *Interfaces and Free Boundaries*, 10(3): 263-282, 2008.

[15] Ruuth, Wetton. A simple scheme for volume-preserving motion by mean curvature. *J. Sci. Comput.*, 19(1): 373-384; Dec 2003.

[16] Ruuth, Merriman. Convolution generated motion and generalized Huygens' principles for interface motion. *SIAM J. Appl. Math.*, 60(3): 868-890, 2000.

[17] Ruuth, Merriman, Osher. Convolution generated motion as a link between cellular automata and continuum pattern dynamics. *J. Comput. Phys.*, 151:836-861, 1999.

[18] Ruuth. Efficient algorithms for diffusion-generated motion by mean curvature. *J. Comput. Phys.*, 144:603-625, 1998.

[19] Ruuth. A diffusion-generated approach to multiphase motion. *J. Comput. Phys.*, 145:166-192, 1998.

PUBLICATIONS: TIME EVOLUTION FOR PDEs (selected)

[20] Chow, Ruuth. Linearly stabilized schemes for the time integration of stiff nonlinear PDEs. *J. Sci. Comp.*, 87(3): 1-29, 2021.

[21] Zhao, Huang, Ruuth. Boundary treatment of high order Runge-Kutta methods for hyperbolic conservation laws. *J. Comput. Phys.*, Volume 421, 2020, 109697.

[22] Ketcheson, Macdonald, Ruuth. Spatially partitioned embedded Runge–Kutta methods. *SIAM J. Numer. Anal.*, 51(5): 2887-2910, 2013.

[23] Motamed, Macdonald, Ruuth. On the linear stability of the fifth-order WENO discretization. *J. Sci. Comp.*, 47(2): 127-149, 2011.

[24] Wang, Ruuth. Variable step-size implicit-explicit linear multistep methods for time-dependent partial differential equations. *J. Comput. Math.*, 26(6):838-855, 2008.

[25] Hundsdorfer, Ruuth. IMEX extensions of linear multistep methods with general monotonicity and boundedness properties. *J. Comput. Phys.*, 225(2): 2016–2042, 2007.

[26] Hundsdorfer, Ruuth. On monotonicity and boundedness properties of linear multistep methods. *Math. Comp.*, 75: 655-672, 2006.

[27] Ruuth. Global optimization of explicit strong-stability-preserving Runge-Kutta methods. *Math. Comp.*, 75: 183-207, 2006.

[28] Ruuth, Hundsdorfer. High-order linear multistep methods with general monotonicity and boundedness properties. *J. Comput. Phys.*, 209(1): 226-248, 2005.

[29] Ruuth, Spiteri. High-order strong-stability-preserving Runge-Kutta methods with downwind-biased spatial discretizations. *SIAM J. Numer. Anal.*, 42(3):974-996, 2004.

[30] Hundsdorfer, Ruuth, Spiteri. Monotonicity-preserving linear multistep methods. *SIAM J. Numer. Anal.*, 41(2): 605-623, 2003.

[31] Spiteri, Ruuth. A new class of optimal high-order strong-stability-preserving time discretization methods. *SIAM J. Numer. Anal.*, 40(2): 469-491, 2002.

[32] Ruuth, Spiteri. Two barriers on strong-stability-preserving time discretization methods. *J. Sci. Comput.*, 17(1-4): 211-220, 2002.

[33] Ascher, Ruuth, Spiteri. Implicit-explicit Runge-Kutta methods for time-dependent partial differential equations. *Appl. Numer. Math.*, 25: 151-167, 1997.

[34] Ascher, Ruuth, Wetton. Implicit-explicit methods for time-dependent PDE's. *SIAM J. Numer. Anal.*, 32: 797-823, 1995.

PUBLICATIONS: SONOLUMINESCENCE (selected)

[35] Bass, Ruuth, Camara, Merriman, Putterman. Molecular dynamics of extreme mass segregation in a rapidly collapsing bubble. *Phys. Rev. Lett.*, 101, 234301 (2008).

[36] Bass, Putterman, Merriman, Ruuth. Symmetry reduction for molecular dynamics simulation of an imploding gas bubble. *J. Comput. Phys.*, 227(3): 2118–2129, 2008.