James Haley Adler
Tufts University Department of Mathematics
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ORCID: 0000-0002-6603-8840

Education

- **University of Colorado at Boulder**, Department of Applied Mathematics - Boulder, CO
  - PhD in Applied Mathematics: May 2009
    Thesis: *Nested Iteration and First-Order Systems Least Squares for Incompressible Resistive Magnetohydrodynamics.*
    Committee: Tom Manteuffel, Steve McCormick, John Ruge, Bobby Philip, Scott Parker
  - Master of Science in Applied Mathematics: May 2006
- **Cornell University**, College of Arts and Sciences - Ithaca, NY
  - Bachelor of Arts in Mathematics, Cum Laude: May 2004
  - Bachelor of Arts in Physics, Concentration in Atmospheric Science, Cum Laude: May 2004

Professional Experience

- **Tufts University Department of Mathematics** - Medford, MA
  Professor: July 2023 - Present
  Associate Professor: September 2016 - June 2023
  Director of Graduate Studies: July 2018 - December 2022
  Assistant Professor: September 2011 - August 2016
- **Lawrence Livermore National Laboratory** - Livermore, CA
  Visiting Scientist/Professional: September 2013 - Present
- **Pennsylvania State University Mathematics Department** - State College, PA
  Research Assistant Professor: August 2009 - July 2011
- **Front Range Scientific Computing Inc.** - Boulder, CO
  Postdoc: June 2009 - August 2009
- **Lawrence Livermore National Laboratory** - Livermore, CA
  Visiting Student Researcher: May 2006 - August 2006; May 2007 - July 2007; May 2008 - June 2008
- **National Center for Atmospheric Research** - Boulder, CO
  Student Researcher: May 2005 - August 2005
- **National High Magnetic Field Laboratory REU Program** - Tallahassee, FL
  Student Researcher: May 2003 - August 2003
- **Cornell Ornithology Lab, Cornell University REU Program** - Ithaca, NY
  Research Assistant: May 2002 - December 2002

Research Interests

My research is in the area of computational mathematics and physics with applications in complex fluids, porous media, soft matter, and electromagnetic problems. My interest is in scientific computing, including both physical modeling as well as numerical computation. I am working on several projects including incompressible resistive magnetohydrodynamic problems, liquid crystal applications, and porous media, using various finite-element methods and multigrid.

Publications

Under Review

[1] J. H. Adler, A. S. Andrei, and T. J. Atherton. Nonlinear methods for shape optimization problems in liquid crystal tactoids. *Submitted*, 2024.

[2] J. H. Adler, S. Hocking, X. Hu, and S. Islam. Physics-informed nonlinear vector autoregressive models for the prediction of dynamical systems. *Submitted*, 2024.

[3] J. H. Adler, X. Hu, X. Wang, and Z. Xue. Improving greedy algorithms for rational approximation. *Submitted*, 2024.

[4] A. Pé de la Riva, F. J. Gaspar, X. Hu, J. H. Adler, C. Rodrigo, and L. T. Zikatanov. Oscillation-free numerical schemes for Biot's model and their iterative coupling solution. *Submitted*, 2024.

[5] J. H. Adler and D. B. Emerson. An error estimator for electrically coupled liquid crystals. *Submitted*, 2023.

[6] C. Joshi, D. Goldstein, C. Wennerholm, E. Downey, E. Hamilton, S. Hocking, A. Andrei, J. H. Adler, and T. J. Atherton. Morpho - a programmable environment for shape optimization and shapeshifting problems. *Submitted*, 2022.

Refereed Publications

[1] J. H. Adler, X. Hu, Y. Li, and L. T. Zikatanov. Parameter-free preconditioning for nearly-incompressible linear elasticity. *Comput. Math. Appl.*, 154:39–44, 2024.

[2] A. Pé de la Riva, C. Rodrigo, F. J. Gaspar, J. H. Adler, X. Hu, and L. T. Zikatanov. A local Fourier analysis for additive Schwarz smoothers. *Comput. Math. Appl.*, 158:13–20, 2024.

[3] J. H. Adler, C. Cavanaugh, X. Hu, A. Huang, and N. Trask. A stable mimetic finite-difference method for convection-dominated diffusion equations. *SIAM J. Sci. Comput.*, 45(6):A2973–A3000, 2023.

[4] J. H. Adler, Y. He, X. Hu, S. MacLachlan, and P. Ohm. Monolithic multigrid for a reduced-quadrature discretization of poroelasticity. *SIAM J. Sci. Comput.*, 45(3):S54–S81, 2023.

[5] C. Rodrigo, F. J. Gaspar, J. H. Adler, X. Hu, P Ohm, and L. T. Zikatanov. Parameter-robust preconditioners for biot's model. *SeMA Journal*, 2023.

[6] S.-Y. Yi, X. Hu, S. Lee, and J. H. Adler. An enriched Galerkin method for the Stokes equations. *Comput. Math. Appl.*, 120:115–131, 2022.

[7] J. H. Adler, T. Benson, E. C. Cyr, P. E. Farrell, S. MacLachlan, and R. Tuminaro. Monolithic multigrid methods for magnetohydrodynamics. *SIAM J. Sci. Comput.*, 43(5):S70–S91, 2021.

[8] J. H. Adler, C. Cavanaugh, X. Hu, and L. T. Zikatanov. A finite-element framework for a mimetic finite-difference discretization of Maxwell's equations. *SIAM J. Sci. Comput.*, 43(4):A2638–A2659, 2021.

[9] J. H. Adler, F. J. Gaspar, X. Hu, P. Ohm, C. Rodrigo, and L. T. Zikatanov. Robust preconditioners for a new stabilized discretization of the poroelastic equations. *SIAM J. Sci. Comput.*, 42(3):B761–B791, 2020.

[10] J. H. Adler, S. MacLachlan, and N. Madden. First-order system least squares finite-elements for singularly perturbed reaction-diffusion equations. In Ivan Lirkov and Svetozar Margenov, editors, *Large-Scale Scientific Computing*, volume 11958 of *Lecture Notes in Computer Science*, pages 3–14. Springer, Cham, 2020.

[11] J. H. Adler, Y. He, X. Hu, and S. P. MacLachlan. Vector-potential finite-element formulations for two-dimensional resistive magnetohydrodynamics. *Comput. Math. Appl.*, 77(2):476 – 493, 2019.

[12] J. H. Adler, X. Hu, L. Mu, and X. Ye. An a posteriori error estimator for the weak Galerkin least-squares finite-element method. *J. Comput. Appl. Math.*, 362:383–399, 2019.

[13] S. Sarkar, S. McKenney, P. Sabhachandani, J. H. Adler, X. Hu, D. Stroopinksy, J. Rosenblatt, D. Avigan, and T. Konry. Anti-myeloma activity and molecular logic operation by natural killer cells in microfluidic droplets. *Sens. Actuators, B-Chem.*, 282:580 – 589, 2019.

[14] J. H. Adler, F. J. Gaspar, X. Hu, C. Rodrigo, and L. T. Zikatanov. Robust block preconditioners for Biot's model. In Petter E. Bjørstad, Susanne C. Brenner, Lawrence Halpern, Hyea Hyun Kim, Ralf Kornhuber, Talal Rahman, and Olof B. Widlund, editors, *Domain Decomposition Methods in Science and Engineering XXIV*, volume 125 of Lecture Notes in Computational Science and Engineering, pages 3–16, Springer, Cham, 2018.

[15] J. H. Adler, I. Lashuk, and S. P. MacLachlan. Composite-grid multigrid for diffusion on the sphere. *Numer. Linear Algebra Appl.*, 25(1):e2115, 2018.

[16] J. H. Adler, I. Lashuk, S. P. MacLachlan, and L. T. Zikatanov. Discrete energy laws for the first-order system least-squares finite-element approach. In Ivan Lirkov and Svetozar Margenov, editors, *Large-Scale Scientific Computing*, volume 10665 of *Lecture Notes in Computer Science*, pages 3–20. Springer, Cham, 2018.

[17] D. B. Emerson, P. E. Farrell, J. H. Adler, S. P. MacLachlan, and T. J. Atherton. Computing equilibrium states of cholesteric liquid crystals in elliptical channels with deflation algorithms. *Liq. Cryst.*, 45(3):341–350, 2018.

[18] C. Rodrigo, X. Hu, P. Ohm, J. H. Adler, F. J. Gaspar, and L. T. Zikatanov. New stabilized discretizations for poroelasticity and the Stokes' equations. *Comput. Methods Appl. Mech. Engrg.*, 341:467–484, 2018.

[19] J. H. Adler, T. R. Benson, and S. P. MacLachlan. Preconditioning a mass-conserving discontinuous Galerkin discretization of the Stokes equations. *Numer. Linear Algebra Appl.*, 24(3):e2047, 2017.

[20] J. H. Adler, D. B. Emerson, P. E. Farrell, and S. P. MacLachlan. Combining deflation and nested iteration for computing multiple solutions of nonlinear variational problems. *SIAM J. Sci. Comput.*, 39(1):B29–B52, 2017.

[21] J. H. Adler, X. Hu, and L. T. Zikatanov. Robust solvers for Maxwell's equations with dissipative boundary conditions. *SIAM J. Sci. Comput.*, 39(5):S3–S23, 2017.

[22] J. H. Adler, T. R. Benson, E. C. Cyr, S. P. MacLachlan, and R. S. Tuminaro. Monolithic multigrid methods for two-dimensional resistive magnetohydrodynamics. *SIAM J. Sci. Comput.*, 38(1):B1–B24, 2016.

[23] J. H. Adler, D. B. Emerson, S. P. MacLachlan, and T. A. Manteuffel. Constrained optimization for liquid crystal equilibria. *SIAM J. Sci. Comput.*, 38(1):B50–B76, 2016.

[24] J. H. Adler, S. P. MacLachlan, and N. Madden. A first-order system Petrov–Galerkin discretization for a reaction–diffusion problem on a fitted mesh. *IMA J. Numer. Anal.*, 36(3):1281–1309, 2016.

[25] A. DeBenedictis, T. J. Atherton, C. Anquetil-Deck, D. J. Cleaver, D. B. Emerson, M. Wolak, and J. H. Adler. Competition of lattice and basis for alignment of nematic liquid crystals. *Phys. Rev. E*, 92:042501, Oct 2015.

[26] J. H. Adler, T. J. Atherton, T. R. Benson, D. B. Emerson, and S. P. MacLachlan. Energy minimization for liquid crystal equilibrium with electric and flexoelectric effects. *SIAM J. Sci. Comput.*, 37(5):S157–S176, 2015.

[27] J. H. Adler, T. J. Atherton, D. B. Emerson, and S. P. MacLachlan. An energy-minimization finite-element approach for the Frank–Oseen model of nematic liquid crystals. *SIAM J. Numer. Anal.*, 53(5):2226–2254, 2015.

[28] J. H. Adler and V. Nistor. Graded mesh approximation in weighted Sobolev spaces and elliptic equations in 2D. *Math. Comp.*, 84(295):2191–2220, 2015.

[29] J. H. Adler, L. Dorfmann, D. Han, S. MacLachlan, and C. Paetsch. Mathematical and computational models of incompressible materials subject to shear. *IMA J. Appl. Math.*, 79(5):889–914, 2014.

[30] J. H. Adler and P. S. Vassilevski. Error analysis for constrained first-order system least-squares finite-element methods. *SIAM J. Sci. Comput.*, 36(3):A1071–A1088, 2014.

[31] J. H. Adler, M. Brezina, T. A. Manteuffel, S. F. McCormick, J. W. Ruge, and L. Tang. Island coalescence using parallel first-order system least squares on incompressible resistive magnetohydrodynamics. *SIAM J. Sci. Comput.*, 35(5):S171–S191, 2013.

[32] J. H. Adler, V. Petkov, and L. T. Zikatanov. Numerical approximation of asymptotically disappearing solutions of Maxwell's equations. *SIAM J. Sci. Comput.*, 35(5):S386–S401, 2013.

[33] J. H. Adler and P. S. Vassilevski. Improving conservation for first-order system least-squares finite-element methods. In *Numerical solution of partial differential equations: theory, algorithms, and their applications*, volume 45 of *Springer Proc. Math. Stat.*, pages 1–19. Springer, New York, 2013.

[34] T. J. Atherton and J. H. Adler. Competition of elasticity and flexoelectricity for bistable alignment of nematic liquid crystals on patterned substrates. *Phys. Rev. E*, 86:040701, Oct 2012.

[35] J. H. Adler, J. Brannick, C. Liu, T. Manteuffel, and L. Zikatanov. First-order system least squares and the energetic variational approach for two-phase flow. *J. Comput. Phys.*, 230(17):6647–6663, 2011.

[36] J. H. Adler, T. A. Manteuffel, S. F. McCormick, J. W. Nolting, J. W. Ruge, and L. Tang. Efficiency based adaptive local refinement for first-order system least-squares formulations. *SIAM J. Sci. Comput.*, 33(1):1–24, 2011.

[37] J. H. Adler, T. A. Manteuffel, S. F. McCormick, and J. W. Ruge. First-order system least squares for incompressible resistive magnetohydrodynamics. *SIAM J. Sci. Comput.*, 32(1):229–248, 2010.

[38] J. H. Adler, T. A. Manteuffel, S. F. McCormick, J. W. Ruge, and G. D. Sanders. Nested iteration and first-order system least squares for incompressible, resistive magnetohydrodynamics. *SIAM J. Sci. Comput.*, 32(3):1506–1526, 2010.

[39] J. H. Adler, T. Manteuffel, S. McCormick, J. Nolting, J. Ruge, and L. Tang. An efficiency-based adaptive refinement scheme applied to incompressible, resistive magnetohydrodynamics. In Ivan Lirkov, Svetozar Margenov, and Jerzy Waśniewski, editors, *Large-Scale Scientific Computing*, volume 5910 of *Lecture Notes in Computer Science*, pages 1–13. Springer Berlin Heidelberg, 2010.

Non-Refereed Proceedings

[1] M. A. Stevens, C. Downs, D. B. Emerson, J. H. Adler, S. P. MacLachlan, and T. E. Vandervelde. Studying anomalous open-circuit voltage drop-out in concentrated photovoltaics using computational numerical analysis. In *Proceedings of the Photvoltaic Specialists Conference (PVSC), 42nd IEEE*, New Orleans, June 14-19 2015.

[2] M. A. Stevens, C. Downs, D. B. Emerson, J. H. Adler, S. P. MacLachlan, and T. E. Vandervelde. Predicting VOC in concentrated photovoltaics using computation numerical analysis. In *30th European Photovoltaic Solar Energy Conference (EUPVSC) Proceedings*, Hamburg, Germany, 2015.

[3] T. J. Atherton and J. H. Adler. Multistable alignment of nematic liquid crystals on patterned surfaces. In *Proceedings of the International Meeting on Information Display*, Daegu, Korea, August 28-31 2012.

[4] J. H. Adler, T. A. Manteuffel, S. F. McCormick, J. W. Nolting, J. W. Ruge, and L. Tang. A parallel adaptive first-order system least-squares (FOSLS) algorithm for incompressible, resisitive magnetohydrodynamics (MHD). In *Proceedings of the Ninth International Conference of Numerical Analysis and Applied Mathematics*, Halkidiki, Greece, September 19-24 2011.

Technical Reports (not refereed)

[1] J. H. Adler, T. J. Atherton, D. B. Emerson, and S. P. MacLachlan. An energy minimization finite-element approach for the Frank-Oseen model of nematic liquid crystals: Continuum and discrete analysis. Technical report, Tufts University, 2014.

[2] J. H. Adler, D. B. Emerson, S. P. MacLachlan, and T. A. Manteuffel. Constrained optimization for liquid crystal equilibria: Extended results. Technical report, Tufts University, 2014.

Grants and Awards

Awards and Honors

- **Graduate School of Arts and Sciences Faculty Teaching and Mentoring Award** - 2023
  Tufts University
- **Math Society Professor of the Year** - 2017/2018
  Department of Mathematics - Tufts University
- **Honorable Mention in Teaching with Technology Awards Program** - May 2012
  Tufts University

External Grants

- **Co-PI - NSF DMS-2208267, Computational Mathematics Program** - Jul. 2022 - Jun. 2025:
  Collaborative Research: Adaptive Mixed-Dimensional Modeling and Simulation of Porous Media

- **Senior Personnel - NSF-EPSRC** - Aug. 2021 - Jul. 2024:
  CBET-EPSRC: Analysis and Optical Control of Surfactant Effects for Increased Lubrication of Liquid Flows in the Cassie State

- **Co-PI - NSF OAC-2003820, Cyberinfrastructure for Sustained Scientific Innovation Program** - Jun. 2020 - May 2024:
  Elements: Morpho-Cyberinfrastructure for Scientists and Engineers Studying Shape Change

- **Co-PI - NSF DMS-1620063, Computational Mathematics Program** - Oct. 2016 - Sept. 2019:
  Robust Solvers for Coupled Problems with Applications to Electromagnetism and Poromechanics

- **Co-PI - NSF DRL-1742369, STEM+C Partnerships Program** - Sept. 2017 - Sept. 2019:
  Collaborative Research: Integrating Computational Making Practices in STEM Teaching

- **PI - NSF DMS-1632111, Conferences and Workshops in the Mathematical Sciences - Computational Mathematics Program** - July 2016:
  International Workshop on Numerical Analysis of Singularly Perturbed Differential Equations - Halifax, Canada

- **PI - NSF DMS-1216972, Computational Mathematics Program** - Sept. 2012 - Aug. 2016:
  Collaborative Research: Advanced Numerical Techniques for the Simulation of Magnetohydrodynamics

- **Senior Personnel (Consultant) - NSF IIS-1217100, Cyberlearning EXP** - Sept. 2012 - Aug. 2015:
  SiMSAM: Bridging Student, Scientific, and Mathematical Models with x Expressive Technologies

- **PI - NSF DMS-1265401, Conferences and Workshops in the Mathematical Sciences - Computational Mathematics Program** - June 2013:
  Collaborative Research: Special Session on Numerical Modeling of Fluids and Structures at the 9th International Conference on Large-Scale Scientific Computations - Sozopol, Bulgaria

Tufts Internal Grants

- **PI - DISC Seed Funding** - 2022-2023:
  On the Predictability Limits of Nonlinear Chaotic Systems: Can Deep Learning Methods Help?

- **Team Member - DISC Seed Funding** - 2021-2022:
  Physics Guided Deep Learning for Actionable Outcomes

- **Co-PI - Tufts Collaborates!** - Jul. 2015 - Jun. 2016:
  Unlocking the Mystery of Ultra-Efficient Solar Cells under Concentration
  PI - Tom Vandervelde - Electrical and Computer Engineering

- **Co-PI - Tufts Collaborates!** - Jul. 2014 - Jun. 2015:
  Fast by Design: Better Liquid Crystal Devices through Theory, Simulation and Experiment
  PI - Tim Atherton - Physics and Astronomy; Co-PI - Jeff Guasto - Mechanical Engineering

- **Faculty Research Awards Committee** - May 2012:
  Grants in Aid: Least-Squares Finite Elements for Problems with Singularities
  Support for collaborative visit

Teaching Experience

- **Short Courses**

Graduate Workshop on Numerical Linear Algebra	May 2014	NUI Galway

- **Reading Courses**

Introduction to Numerical PDEs		Tufts
Introduction to Finite Elements and Multigrid		Tufts
Introduction to Finite Elements		Tufts
Nonlinear Finite Elements		Tufts
Advanced Applied Mathematics		Tufts

- **Multi-Section Course Coordinator**

MATH 42	(Multivariable Calculus)	Tufts

- **Instructor of Record**

MATH 036	(Applied Calculus II)	Tufts
MATH 042	(Multivariable Calculus)	Tufts
MATH 051	(Differential Equations)	Tufts
MATH 087	(Mathematical Modeling and Computation)	Tufts
MATH 125	(Introduction to Numerical Analysis)	Tufts
MATH 220	(Top Ten Algorithms of the 20th Century)	Tufts
MATH 250	(Applied and Computational Math Seminar)	Tufts
MATH 255	(Partial Differential Equations I)	Tufts
MATH 256	(Partial Differential Equations II)	Tufts
MATH 257	(Numerical Partial Differential Equations)	Tufts
MATH 140	(Calculus with Analytical Geometry II)	PSU
MATH 230	(Multivariable Calculus)	PSU
MATH 141	(Calculus with Analytical Geometry II)	PSU
Oral Exam Facilitator for APPM 1350	(Calculus I)	UC Boulder
APPM 5600	(Introduction to Numerical Analysis I)	UC Boulder
APPM 7400	(Teaching and Research Excellence Seminar)	UC Boulder
GEEN 1360	(Calculus II Workgroup)	UC Boulder
APPM 2450	(Calculus III Lab)	UC Boulder

Advising

- **Postdoctoral Sponsor**
  Ilya Lashuk - Department of Mathematics - Tufts University - 2014-2015
- **PhD Advisor/CoAdvisor**
  Zhongqin Xue - Department of Mathematics - Tufts University - 2023-Present
  Anca Andrei - Department of Mathematics - Tufts University - 2019-Present
  Casey Cavanaugh - Department of Mathematics - Tufts University - 2018-2022
  Dong Han - Department of Mathematics - Tufts University - 2011-2021
  Peter Ohm - Department of Mathematics - Tufts University - 2016-2020
  David Emerson - Department of Mathematics - Tufts University - 2012-2015
  Thomas Benson - Department of Mathematics - Tufts University - 2012-2015
- **MS Thesis Advisor/CoAdvisor**
  Samuel Hocking - Department of Mathematics - Tufts University - 2022-2024

Outreach and Service

Editorial Work

- **Associate Editor:** 2019 - Present
  SIAM Journal on Matrix Analysis and Applications (SIMAX)

- **Guest Associate Editor:** 2023 - 2024
  SIAM Journal of Scientific Computing (SISC) Copper Mountain Special Section on Multigrid Methods

- **Guest Associate Editor:** 2021 - 2022
  SIAM Journal of Scientific Computing (SISC) Copper Mountain Special Section on Multigrid Methods

- **Guest Editor:** 2019 - 2020
  Journal of Numerical Linear Algebra and Applications (NLAA) Copper Mountain Special Issue

- **Referee for Various Journals:**
  e.g. SIAM Journal on Scientific Computing (SISC), SIAM Journal on Numerical Analysis (SINUM), Journal of Computational Physics (JCP), Journal of Numerical Linear Algebra and Applications (NLAA), Computers and Mathematics with Applications (CAMWA), and other proceedings journals.

Conference/Workshop Organization

- **Scientific Committee Member:** 2015 - Present
  International Conference on Large-Scale Scientific Computations - Sozopol, Bulgaria

- **Program Committee Member:** 2019 - Present
  Copper Mountain Conference on Multigrid Methods - Copper Mountain, CO

- **Organizing Committee Member:** 2023 - Present
  HPC Day - UMass Dartmouth

- **Co-Organizer of a Graduate Workshop on Numerical Linear Algebra:** May 12-14, 2014
  National University of Ireland, Galway - Galway, Ireland

- **Chair of Local Organizing Committee on Fluid Dynamics:** August 2014
  XXVI IUPAP Conference on Computational Physics (CCP2014) - Boston University

- **Co-Organizer of IMA PI Workshop on Numerical Simulations of Complex Fluids and MHD:** March 2010
  Pennsylvania State University, Department of Mathematics - State College, PA

- **Co-Organizer of Center for Computational Mathematics and Applications Seminar:** Sept. 2009 - May 2011
  Pennsylvania State University, Department of Mathematics - State College, PA

Special Session/Minisymposia

- **Co-Organizer of Special Session on Fractures and Mixed-Dimensional Modeling: Discretizations, Solvers, and Methodology:** June 2023
  14th International Conference on Large-Scale Scientific Computations - Sozopol, Bulgaria

- **Co-Organizer of Special Session on Advanced Discretizations and Solvers for Coupled Systems of Partial Differential Equations:** July 2021
  VI ECCOMAS Young Investigators Conference - Virtual

- **Co-Organizer of Special Session on Advanced Discretizations and Solvers for Coupled Systems of Partial Differential Equations:** June 2021
  13th International Conference on Large-Scale Scientific Computations - Sozopol, Bulgaria

- **Co-Organizer of Minisymposium on Advanced Discretizations and Solvers for Coupled Systems of Partial Differential Equations:** March 2021
  SIAM Conference on Computational Science and Engineering (CS&E) - Virtual

- **Co-Organizer of Special Session on Numerical Methods for Flow in Deformable Porous Media:** June 2019
  12th International Conference on Large-Scale Scientific Computations - Sozopol, Bulgaria

- **Co-Organizer of Minisymposium on Recent Advances in Multilevel Solvers:** Feburary 2019
  SIAM Conference on Computational Science and Engineering (CS&E) - Spokane, WA

- **Co-Organizer of Minisymposium on Development of Multilevel Methods for Coupled Physics Applications:** July 2018
  25th International Domain Decomposition Conference - Newfoundland, Canada

- **Co-Organizer of Special Session on Advanced Discretizations and Solvers for Coupled Systems of Partial Differential Equations:** June 2017
  11th International Conference on Large-Scale Scientific Computations - Sozopol, Bulgaria

- **Co-Organizer of Minisymposium on Advances in Finite Element Methods for Nonlinear Materials:** June 2016
  The Mathematics of Finite Elements and Applications 2016 - London, England

- **Co-Organizer of Special Session on Numerical Methods for Multiphysics Problems:** June 2015
  10th International Conference on Large-Scale Scientific Computations - Sozopol, Bulgaria

- **Co-Organizer of Minisymposium on Advanced Finite-Element Methods for Nonlinear Materials and Fluids:** March 2015
  SIAM Conference on Computational Science and Engineering - Salt Lake City, UT

- **Co-Organizer of Special Session on Numerical Modeling of Fluids and Structures:** June 2013
  9th International Conference on Large-Scale Scientific Computations - Sozopol, Bulgaria

- **Co-Organizer of Minisymposium on Advanced Discretizations and Solvers for Complex Fluid Applications:** February 2013
  SIAM Conference on Computational Science and Engineering - Boston, MA

Professional Outreach

- **Working Group Member:** September 2020 - May 2021
  American Mathematical Society (AMS) Paradigms (Diversity in Graduate Mathematical Sciences) - Zoom
  Met monthly with Mathematics faculty from other universities to discuss diversity and inclusion in our graduate programs.

- **Lead Graduate Teacher:** August 2005 - May 2006
  University of Colorado, Department of Applied Mathematics - Boulder, CO
  Supported teacher training in the Department of Applied Mathematics.

- **Alumni Ambassador:** September 2004 - February 2009
  Cornell Alumni Admissions Network - Boulder, CO
  Conducted admission interviews for high school students in the Boulder area.

Invited Talks and Visits

Plenary/Keynote Speaker

- **Plenary Speaker - 11th International Conference on Large-Scale Scientific Computations:**
  June 7, 2017 - Sozopol, Bulgaria
  Energy-Minimization, Finite Elements, and Multilevel Methods for Liquid Crystals

Invited Workshop Talks

- **NSF CompMath PI Meeting - U. of Washington:**
  July 16, 2024 - Seattle, WA
  A New Decoupled Solution Method for a Novel Oscillation-Free Numerical Scheme for Biot's Model
- **Numerical Methods and New Perspectives for Extended Liquid Crystalline Systems Workshop - ICERM:**
  December 9, 2019 - Providence, RI
  Energy-Minimization, Finite Elements, and Multilevel Methods for Nematic Liquid Crystals

- **Eighth Singular Days:**
  June 28, 2016 - Nancy, France
  Graded Mesh Approximation in Weighted Sobolev Spaces and Elliptic Equations in 2D
- **Minimum Residual and Least-Squares Finite-Element Methods Workshop:**
  November 2, 2015 - Delft, Netherlands
  A First-Order System Petrov-Galerkin Discretization for Singularly Perturbed Reaction-Diffusion
- **Workshop on Finite Element Methods - Beijing Institute for Scientific and Engineering Computing:**
  August 8, 2015 - Beijing, China
  Numerical Approximation of Asymptotically Disappearing Solutions of Maxwell's Equations
- **Least Squares Finite Elements in Fluid and Solid Mechanics Workshop - Leibniz Universität:**
  June 21, 2012 - Hannover, Germany
  Constrained First-Order System Least Squares for Improved Mass Conservation and Complex Fluids
- **IMA PI Workshop on Numerical Simulations of Complex Fluids:**
  March 3, 2010 - State College, PA
  First-Order System Least Squares Approach to Resistive Magnetohydrodynamics
- **AMR08 Applied Mathematics Principal Investigators Meeting:**
  October 15, 2008 - Argonne National Laboratory, IL
  Nested Iteration First-Order System Least Squares Algebraic Multigrid on Resistive Magnetohydrodynamics

Short-Term Visits

- **Visit to the Institute for Computational and Experimental Research in Mathematics (ICERM)**
  Spring 2024 - Providence, RI
  Short-term visit to attend Semester on Numerical PDEs: Analysis, Algorithms, and Data Challenges
- **Visit to University of Maryland**
  Fall 2017 - College Park, MD
  Short-term visit to collaborate with Howard Elman
- **Visit to the National University of Ireland, Galway:**
  May 11 - 16, 2014 - Galway, Ireland
  Short-term visit to collaborate with Niall Madden
- **Visit to University of Colorado at Boulder:**
  March 30 - April 5, 2014 - Boulder, CO
  Short-term visit to collaborate with Tom Manteuffel
- **Visit to University of Illinois at Urbana-Champaign:**
  January 22, 2014 - Urbana, IL
  Short-term visit to collaborate with Luke Olson
- **Visiting Scientist - Penn State University:**
  November 2013 - State College, PA
  Short-term visit to collaborate with James Brannick, Chun Liu, and Ludmil Zikatanov
- **Visiting Scientist - Lawrence Livermore National Laboratory:**
  September 2013-September 2014 - Livermore, CA
  Short-term visits to the Center for Applied Scientific Computing (CASC) to collaborate with Panayot Vassilevski
- **Visit to Würzburg University:**
  June 19 - 20, 2012 - Würzburg, Germany
  First-Order System Least-Squares, Multigrid, and Adaptive Local Refinement for Complex Fluids
- **Visit to Centre de Recerca Matemática (CRM):**
  June 11 - 17, 2011 - Bellaterra, Spain
  Nested Iteration, Algebraic Multigrid and Adaptive Local Refinement for MHD and Complex Fluids
- **Visit to Radon Institute for Computational and Applied Mathematics (RICAM):**
  May 30 - June 4, 2011 - Linz, Austria
  Collaboration with Johannes Kraus

Colloquia/Seminars

- **Computational and Applied Mathematics Colloquium - The Pennsylvania State University:**
  November 1, 2021 - via Zoom
  Robust Multilevel Preconditoners for a New Stabilized Discretization of the Poroelastic Equation

- **Numerical Analysis & PDEs Seminar - University of Delaware:**
  April 16, 2021 - via Zoom
  Robust Multilevel Preconditoners for a New Stabilized Discretization of the Poroelastic Equation
- **Mathematics Colloquium - University of New Mexico:**
  February 16, 2021 - via Zoom
  Robust Multilevel Preconditoners for a New Stabilized Discretization of the Poroelastic Equation
- **Mathematics Colloquium - Old Dominion University:**
  November 12, 2020 - via Zoom
  A Stabilized Discretization and Robust Solvers for Poroelasticity
- **Applied Mathematics Seminar - University of Georgia:**
  November 11, 2020 - via Zoom
  A Stabilized Discretization and Robust Solvers for Poroelasticity
- **Applied Mathematics and Computation Seminar - University of Massachusetts Amherst:**
  March 10, 2020 - Amherst, MA
  A Stabilized Discretization and Robust Solvers for Poroelasticity
- **Numerical Analysis Seminar - University of Maryland College Park:**
  December 5, 2017 - Baltimore, MD
  Energy-Minimization, Finite Elements, and Multilevel Methods for Liquid Crystals
- **Differential Equations Seminar - University of Maryland Baltimore County:**
  November 13, 2017 - Baltimore, MD
  Energy-Minimization, Finite Elements, and Multilevel Methods for Liquid Crystals
- **Oberseminar in Numerische Mathematik - University of Duisburg-Essen:**
  May 30, 2017 - Essen, Germany
  Numerical Approximation of Asymptotically Disappearing Solutions of Maxwell's Equations
- **Center for Computational Mathematics and Applications Colloquium - Penn State University:**
  March 20, 2017 - State College, PA
  Energy Minimization and a Deflation Technique for Detecting Multiple Liquid Crystal Equilibrium States
- **Department of Mathematics Colloquium - Ithaca College:**
  November 17, 2016 - Ithaca, NY
  Energy Minimization and a Deflation Technique for Detecting Multiple Liquid Crystal Equilibrium States
- **Seminar on Numerical Methods for Partial Differential Equations - MIT:**
  April 8, 2015 - Cambridge, MA
  An Energy-Minimization Finite-Element Approach for the Frank-Oseen Model of Nematic Liquid Crystals
- **Numerical Mathematics Workgroup Seminar - Universität Duisburg-Essen:**
  July 14, 2014 - Essen, Germany
  An Energy-Minimization Finite-Element Approach for the Frank-Oseen Model of Nematic Liquid Crystals
- **Center for Computational and Applied Mathematics Lunch Seminar - Purdue University:**
  January 24, 2014 - West Lafayette, IN
  An Energy-Minimization Finite-Element Approach for the Frank-Oseen Model of Nematic Liquid Crystals
- **Center for Computational Mathematics and Applications Colloquium - Penn State University:**
  February 8, 2013 - State College, PA
  Constrained First-Order System Least Squares for Improved Mass Conservation and Complex Fluids
- **Center for Computational Mathematics and Applications Luncheon Seminar - Penn State University:**
  February 8, 2013 - State College, PA
  Numerical Approximation of Asymptotically Disappearing Solutions of Maxwell's Equations
- **Schlumberger-Tufts Computational and Applied Math Seminar - Schlumberger:**
  April 10, 2012 - Cambridge, MA
  First-Order System Least-Squares, Multigrid, and Adaptive Local Refinement for Complex Fluids
- **Tufts Physics Condensed Matter Seminar Series - Tufts University:**
  January 19, 2012 - Medford, MA
  Adaptive Finite Elements and Multigrid for Complex Fluids and Magnetohydrodynamics
- **Applied and Computational Mathematics Seminar (ACMS) - Dartmouth College:**
  January 17, 2012 - Hanover, NH
  Nested Iteration, Algebraic Multigrid, and First-Order Least Squares System Finite-Element Method for Magnetohydrodynamics
- **Computational Math Seminar - University of Colorado:**
  March 9, 2010 - Boulder, CO
  Energetic Variational Approach for Magnetohydrodynamics