

DONALD ESTEP

CONTACT INFORMATION

Address Department of Statistics & Actuarial Science
Simon Fraser University
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EDUCATION

1977-81 B.A. Columbia College, Columbia University
Swimming Junior Varsity

1981-87 M.S., Ph.D. Department of Mathematics, University of Michigan
Advisor: Jeffrey Rauch
Thesis: L^∞ Bounds for L^2 Stable Operators in One Dimension

ACADEMIC CAREER

1987-2000 School of Mathematics, Georgia Institute of Technology
Assistant, Associate, Full Professor

2000-2014 Department of Mathematics, Colorado State University
Associate, Full Professor

2006-2020 Department of Statistics, Colorado State University
Full Professor

2017-2020 Colorado State University
University Distinguished Professor

2019- Department of Statistics and Actuarial Science, Simon Fraser University
Full Professor and Canada (Tier 1) Research Chair

ADMINISTRATIVE APPOINTMENTS

2003-09 (co) Director, Program for Interdisciplinary Mathematics, Ecology, and Statistics
A National Science Foundation IGERT project at Colorado State University

2006-19 Director, Center for Interdisciplinary Mathematics and Statistics
A Program of Research and Scholarly Excellence at Colorado State University

2017-19 Chair, Department of Statistics

2019- Director, Canadian Statistical Sciences Institute (CANSSI)

LONG TERM VISITS

3/90-7/90, 3/94-8/94, 3/95-7/95 Department of Mathematics, Chalmers University of Technology, Göteborg, Sweden

3/98-4/98 Mittag-Leffler Institute, Stockholm, Sweden

1991-93 Applied Mathematics, California Institute of Technology

8/10-12/10 Department of Atmospheric Sciences, Colorado State University

AWARDS

1993-95 International Research Fellow, National Science Foundation

2005 Outstanding Professor in Graduate Instruction in Mathematics, Colorado State University
 2005 Computational and Mathematical Methods in Science and Engineering (CMMSE) Prize
 2007 Excellence in Teaching Award for Graduate Education and Mentoring, College of Natural Sciences, Colorado State University
 2008-20 Program of Research and Scholarly Excellence distinction for the Center for Interdisciplinary Mathematics and Statistics at Colorado State University
 2009-20 University Interdisciplinary Research Scholar, Colorado State University
 2009 Oliver P. Pennock Distinguished Service Award, Colorado State University
 2011 University Scholarship Impact Award, Colorado State University
 2013-14 Chalmers Jubilee Professor, Chalmers University of Technology, Göteborg, Sweden
 2014- Fellow of the Society for Industrial and Applied Mathematics
 2017-20 University Distinguished Professor, Colorado State University
 2020- Canada Research Chair (Tier 1), Computational Probability and Uncertainty Quantification

EDITORIAL BOARDS

2019- Editorial Board, *Computational and Mathematical Methods*
 2005- Associate Editor, *SIAM Journal on Numerical Analysis*
 2006–07 Associate Editor, *International Journal of Computer Mathematics*
 2008 – Associate Editor, *Journal of Applied Mathematics and Computing*
 2009-12 Associate Editor, *Multiphysics Modeling Book Series*, A. A. Balkema Publishing
 2012 - Advisory Editor, *International Journal of Computer Mathematics*
 2010 - Associate Editor, *International Journal for Uncertainty Quantification*
 2009 - Editor in Chief, *SIAM Book Series on Computational Science and Engineering*
 2012-17 Co-Editor in Chief (founding), *SIAM/ASA Journal on Uncertainty Quantification*
 2005-20 Associate Editor, *SIAM/ASA Journal on Uncertainty Quantification*

PRINCIPAL PROFESSIONAL APPOINTMENTS

- Member, *SIAM Education Committee*, 2006-2011
- Member, Department of Energy, *Applied Mathematics Strategic Plan Recommendation Panel*, 2008, report *Applied Mathematics at the U.S. Department of Energy: Past, Present, and Future* published by DOE and SIAM
- Program Leader, *SAMSI Program on Environmental Sensor Networks*, 2008-2009
- Associate Chair, Department of Mathematics, 2008-2010
- Advisory Board, *Center for Advanced Modeling and Simulation*, Idaho National Laboratory, 2009-12
- Governing Board, *Statistical and Applied Mathematical Sciences Institute (SAMSI)*, 2009-2014
- Member, *National Science Foundation Office of Cyberinfrastructure Grand Challenges Communities Task Force*, Co-Lead of the Computational Methodologies Working Group, 2009-2010, co-author of Task Force report
- Moderator, *SAMSI National SIAM and ASA Town Hall Meeting on Uncertainty Quantification*, 2010
- Co-Organizer and first Chair, *SIAM Activity Group on Uncertainty Quantification*, 2010-12
- Program Leader, *SAMSI Program on Uncertainty Quantification*, 2011-2012
- Co-Chair, *SIAM ASA USACM Conference on Uncertainty Quantification*, 2011-2012
- Member, *American Mathematical Society Simmons Travel Grants Committee*, 2011-2013
- Moderator, *Mathematics in the Geosciences Workshop*, Northwestern University, 2011
- Member, *Computer and Information Sciences External Review Board*, Sandia National Laboratories,

2012-2015

- Member, *SIAM Book Committee*, 2013-2019
- Associate Chair for Graduate Studies, Department of Statistics, Colorado State University, 2014-16
- Chair of the Department of Statistics, Colorado State University, 2017-2019
- Director, Canadian Statistical Sciences Institute (CANSSI), 2019-

PEER-REVIEWED RESEARCH ARTICLES

1. *Boundedness of dispersive difference schemes*, D. Estep, M. Loss, and J. Rauch, *Mathematics of Computation* 55 (1990), 55-87
2. *Some stability aspects of schemes for the adaptive integration of stiff initial value problems*, L. Dieci and D. Estep, *SIAM Journal on Scientific and Statistical Computing* 12 (1991), 1284-1303
3. *The discontinuous Galerkin method for semilinear parabolic problems*, D. Estep and S. Larsson, *RAIRO Modélisation Mathématique et Analyse Numérique* 27 (1993), 35-54
4. *Global error control for the continuous Galerkin finite element method for ordinary differential equations*, D. Estep and D. French, *RAIRO Modélisation Mathématique et Analyse Numérique* 28 (1994), 815-852
5. *An analysis of numerical approximations of metastable solutions of the bistable equation*, D. Estep, *Nonlinearity* 7 (1994), 1445-1462
6. *A normal form analysis of dispersion in numerical schemes for the linear Korteweg-deVries equation*, D. Estep, *Applicable Analysis* 52 (1994), 53-68
7. *A posteriori error bounds and global error control for approximations of ordinary differential equations*, D. Estep, *SIAM Journal on Numerical Analysis* 32 (1995), 1-48
8. *The rate of error growth in Hamiltonian-conserving integrators*, D. Estep and A. Stuart, *Zeitschrift für Angewandte Mathematik und Physik* 46 (1995), 407-418
9. *Introduction to adaptive methods for differential equations*, K. Eriksson, D. Estep, P. Hansbo and C. Johnson, *Acta Numerica* (1995), 105-158.
10. *h-adaptive boundary element schemes*, C. Carstensen, D. Estep and E. Stephan, *Computational Mechanics* 15 (1995), 372-383
11. *A modified equation for dispersive difference schemes*, D. Estep, *Applied Numerical Mathematics* 17 (1995), 299-309
12. *Introduction to computational methods for differential equations*, K. Eriksson, D. Estep, P. Hansbo, and C. Johnson, in *Theory of Numerics for Ordinary and Partial Differential Equations*, M. Ainsworth, J. Levesley, W. A. Light, and M. Marletta, eds, Oxford University Press, New York, 1995
13. *Accurate parallel integration of large sparse systems of differential equations*, D. Estep and R. Williams, *Mathematical Models and Methods in Applied Sciences* 6 (1996), 535-568
14. *Error estimation for numerical differential equations*, D. Estep, S. Verduyn Lunel and R. Williams, *Invited Article, IEEE Antenna and Propagation Magazine* 38 (1996), 71-76
15. *The computability of the Lorenz system*, D. Estep and C. Johnson, *Mathematical Models and Methods in Applied Sciences* 8 (1998), 1277-1305
16. *Computational error estimation and adaptive mesh refinement for a finite element solution of launch vehicle trajectory problems*, D. Estep, D. Hodges and M. Warner, *SIAM Journal on Scientific Computing* 21 (2000), 1609-1631 (electronic)
17. *Using Krylov-subspace iterations in discontinuous Galerkin methods for nonlinear reaction-diffusion systems*, D. Estep and R. Freund, in *Lecture Notes in Computational Science and Engineering* 11, B. Cockburn, G. E. Karniadakis, C. -W. Shu, Eds, Springer-Verlag, New York, 2000, 327-336.

18. *The solution of a launch vehicle trajectory problem by an adaptive finite element method*, D. Estep, D. H. Hodges, M. Warner, *Computer Methods in Applied Mechanics and Engineering*, 190 (2001), 4677-4690
19. *Analysis of shear layers in a fluid with temperature-dependent viscosity*, D. Estep, S. Verduyn Lunel, and R. Williams, *Journal on Computational Physics* 173 (2001), 17-60.
20. *Accounting for stability: a posteriori estimates based on residuals and variational analysis*, D. Estep, M. Holst, D. Mikulencak, *Communications in Numerical Methods in Engineering* 18 (2002), 15-30
21. *The dynamical behavior of the discontinuous Galerkin method and related difference schemes*, D. Estep and A. Stuart, *Mathematics of Computation* 71 (2002), 1075-1103
22. *Generalized Green's functions and the effective domain of influence*, D. Estep, M. Holst, and M. Larson, *SIAM Journal on Scientific Computing* 26 (2005), 1314-1339
23. *Fast and reliable methods for determining the evolution of uncertain parameters in differential equations*, D. Estep and D. Neckels, *Journal on Computational Physics* 213 (2006), 530-556
24. *The nonlinear power method*, S. Eastman and D. Estep, *Applicable Analysis* 86 (2007), 1303 – 1314
25. *Fast methods for determining the evolution of uncertain parameters in reaction-diffusion equations*, D. Estep and D. Neckels, *Computer Methods in Applied Mechanics and Engineering* 196 (2007), 3967 – 3979
26. *A posteriori – a priori analysis of multiscale operator splitting*, D. Estep, V. Ginting, D. Ropp, J. Shadid, and S. Tavener, *SIAM Journal on Numerical Analysis* 46 (2008), 1116-1146
27. *Continuum modeling of large networks*, E. Chong, D. Estep, and J. Hannig, *International Journal of Numerical Modeling: Electronic Networks, Devices, and Fields*, 21 (2008), 169-186
28. *A posteriori error estimation of approximate boundary fluxes*, T. Wildey, S. Tavener, and D. Estep, *Communications in Numerical Methods in Engineering*, 24 (2008), 421-434
29. *A posteriori analysis and improved accuracy for an operator decomposition solution of a conjugate heat transfer problem*, D. Estep, S. Tavener, T. Wildey, *SIAM Journal on Numerical Analysis*, 46 (2008), 2068-2089
30. *Analysis of the sensitivity properties of a model of vector-borne bubonic plague*, M. Buzby, D. Neckels, M. Antolin, and D. Estep, *Royal Society Journal Interface*, 5 (2008), 1099-1107
31. *A posteriori analysis and adaptive error control for multiscale operator decomposition methods for coupled elliptic systems I: Triangular systems*, V. Carey, D. Estep, and S. Tavener, *SIAM Journal on Numerical Analysis* 47 (2009), 740-761
32. *Nonparametric density estimation for randomly perturbed elliptic problems II: Applications and adaptive modeling*, D. Estep, A. Malqvist, S. Tavener, *International Journal for Numerical Methods in Engineering* 80 (2009), 846-867
33. *A posteriori error analysis for a transient conjugate heat transfer problem*, D. Estep, S. Tavener, T. Wildey, *Finite Elements in Analysis and Design* 45 (2009), 263-271
34. *Nonparametric density estimation for randomly perturbed elliptic problems I: Computational methods, a posteriori analysis, and adaptive error control*, D. Estep, A. Malqvist, and S. Tavener, *SIAM Journal on Scientific Computing* 31 (2009), 2935-2959
35. *A posteriori error analysis of a cell-centered finite volume method for semilinear elliptic problems*, D. Estep, M. Pernice, D. Pham, S. Tavener, H. Wang, *Journal of Computational and Applied Mathematics* 233 (2009), 459-472
36. *A posteriori error estimation and adaptive mesh refinement for a multi-discretization operator decomposition approach to fluid-solid heat transfer*, D. Estep, S. Tavener, T. Wildey, *Journal of Computational Physics* 229 (2010), 4143-4158
37. *Blockwise adaptivity for time dependent problems based on coarse scale adjoint solutions*, V. Carey,

- D. Estep, A. Johansson, M. Larson, and S. Tavener, *SIAM Journal on Scientific Computing* 32 (2010), 2121-2145
38. *A measure-theoretic computational method for inverse sensitivity problems I: Method and analysis*, J. Breidt, T. Butler and D. Estep, *SIAM Journal on Numerical Analysis* 49 (2011), 1836-1859
 39. *A posteriori error analysis for a cut cell finite volume method*, D. Estep, S. Tavener, M. Pernice and H. Wang, *Computer Methods in Applied Mechanics and Engineering* 200 (2011), 2768-2781
 40. *Nonparametric density estimation for randomly perturbed elliptic problems III: Convergence, complexity, and generalizations*, D. Estep, M. Holst, A. Malqvist, *Journal of Applied Mathematics and Computing* 38 (2012), 367-387
 41. *Optimal design and directional leverage with applications in differential equation models*, N. Burch, D. Estep, and J. Hoeting, *Metrika*, DOI: 10.1007/s00184-011-0358-4, 2011
 42. *A computational measure theoretic approach to inverse sensitivity problems II: A posteriori error analysis*, T. Butler, D. Estep and J. Sandelin, *SIAM Journal on Numerical Analysis*, 50 (2012), 22-45
 43. *Viscoelastic effects during loading play an integral role in soft tissue mechanics*, K. Troyer, D. Estep, and C. Puttlitz, *Acta Biomaterialia* 8 (2012), 234-244
 44. *A posteriori analysis of multirate numerical method for ordinary differential equations*, D. Estep, V. Ginting, S. Tavener, 2012, *Computer Methods in Applied Mechanics and Engineering*, 223-224 (2012), 10-27
 45. *Adaptive error control for an elliptic optimization problem*, *Applicable Analysis*, D. Estep and S. Lee, 2012, DOI:10.1080/00036811.2012.683785, 1-15
 46. *A numerical method for solving a stochastic inverse problem for parameters*, T. Butler and D. Estep, *Annals of Nuclear Energy*, 2012, 86-94, 10.1016/j.anucene.2012.05.016
 47. *Analysis of routing protocols and interference-limited communication in large networks via continuum modeling*, N. Burch, E. Chong, D. Estep, J. Hannig, *Journal of Engineering Mathematics*, 79 (2013), 183-199
 48. *Multiphysics simulations: Challenges and opportunities*, D. E. Keyes, L. C. McInnes, C. Woodward, W. Gropp, E. Myra, M. Pernice, J. Bell, J. Brown, A. Clo, J. Connors, E. Constantinescu, D. Estep, K. Evans, C. Farhat, A. Hakim, G. Hammond, G. Hansen, J. Hill, T. Isaac, X. Jiao, K. Jordan, D. Kaushik, E. Kaxiras, A. Koniges, K. Lee, A. Lott, Q. Lu, J. Magerlein, R. Maxwell, M. McCourt, M. Mehl, R. Pawlowski, A. Peters Randles, D. Reynolds, B. Riviere, U. Ruede, T. Scheibe, J. Shadid, B. Sheehan, M. Shephard, A. Siegel, B. Smith, X. Tang, C. Wilson, and B. Wohlmuth, *International Journal of High Performance Computing Applications* 27 (2013)
 49. *Continuum modeling and control of large nonuniform wireless networks via nonlinear partial differential equations*, Y. Zhang, E. Chong, J. Hannig, and D. Estep, *Abstract and Applied Analysis* 16 (2013), doi:10.1155/2013/262581, 1-16
 50. *A posteriori analysis of an iterative multi-discretization method for reaction-diffusion systems*, D. Estep, V. Ginting, J. Hameed, and S. Tavener, *Computer Methods in Applied Mechanics and Engineering*, 267 (2013), 1-22
 51. *A posteriori analysis and adaptive error control for operator decomposition solution of coupled semilinear elliptic systems*, V. Carey, D. Estep, S. Tavener, *International Journal of Numerical Methods in Engineering* 94 (2013), 826-849
 52. *A-posteriori error estimates for mixed finite element and finite volume methods for problems coupled through a boundary with non-matching grids*, T. Arbogast, D. Estep, B. Sheehan, and S. Tavener, *IMA Journal of Numerical Analysis*, 24 (2013), 1625-1653
 53. *Approximating extremely large networks via continuum limits*, Y. Zhang, E. Chong, J. Hannig, and D. Estep, *IEEE Access*, 1 (2013), 577-595
 54. *A posteriori error estimation for the Lax-Wendroff finite difference scheme*, J. B. Collins, D. Estep,

- and S. Tavener, *Journal of Computational and Applied Mathematics* 263C (2014), 299-311
55. *A measure-theoretic computational method for inverse sensitivity problems III: Multiple quantities of interest*, T. Butler, D. Estep, S. Tavener, C. Dawson, J. Westerink, *SIAM ASA Journal on Uncertainty Quantification*, 2 (2014), 174-202
 56. *Uncertainty quantification for approximate p -quantiles for physical models with stochastic inputs*, D. Elfverson, D. Estep, F. Hellman, A. Malqvist, *SIAM ASA Journal on Uncertainty Quantification*, 2 (2014), 826–850
 57. *A posteriori error analysis of IMEX time integration schemes for advection-diffusion-reaction equations*, J. Chaudry, D. Estep, V. Ginting, J. Shadid, and S. Tavener, *Computer Methods in Applied Mechanics and Engineering*, 285 (2014), 730-751
 58. *A posteriori error analysis for finite element methods with projection operators as applied to explicit time integration techniques*, J. Collins, D. Estep and S. Tavener, *BIT Numerical Mathematics*, 55 (2015) 1017-1042
 59. *The interaction of iteration error and stability for linear partial differential equations coupled through an interface*, B. Sheehan, D. Estep, S. Tavener, J. Cary, S. Kruger, A. Hakim, A. Pletzer, J. Carlsson, and S. Vadlamani, *Advances in Mathematical Physics*, 2015, 13 pages, doi:10.1155/2015/787198
 60. *A posteriori error estimates for mixed finite element and finite volume methods for parabolic problems coupled through a boundary with non-matching discretizations*, T. Arbogast, D. Estep, B. Sheehan, and S. Tavener, *SIAM ASA Journal on Uncertainty Quantification*, 3 (2015), 169-198
 61. *Adaptive finite element solution of multiscale PDE-ODE systems*, A. Johansson, J. H. Chaudhry, V. Carey, D. Estep, V. Ginting, M. Larson, and S. Tavener, *Computer Methods in Applied Mechanics and Engineering*, 287 (2015), 150–171
 62. *Definition and solution of a stochastic inverse problem for the Manning's n parameter field in hydrodynamic models*, T. Butler, L. Graham, D. Estep, C. Dawson, and J.J. Westerink, *Advances in Water Resources*, 78 (2015), 60–79
 63. *A posteriori analysis for iterative solvers for non-autonomous evolution problems*, J. H. Chaudry, D. Estep, V. Ginting, and S. Tavener, *SIAM ASA Journal on Uncertainty Quantification*, 3 (2015), 434-459
 64. *On a perturbation method for stochastic parabolic PDE*, D. Estep and P. Polyakov, *Communications in Mathematics and Statistics*: 3 (2015), 215-226
 65. *A posteriori error estimation for a cut cell finite volume method with uncertain interface location*, J. B. Collins, D. Estep, and S. Tavener, *International Journal of Uncertainty Quantification*, 5 (2015), 415-432
 66. *Parameter estimation and prediction for groundwater contamination based on measure theory*, Troy Butler, Clint Dawson, Donald Estep, Steven Mattis, Velimir Vesselinov, *Water Resources Research*, 52 (2015), 7808-7629
 67. *A posteriori error analysis of two stage computation methods with application to efficient resource allocation and the Parareal Algorithm*, J. H. Chaudhry, D. Estep, S. Tavener, V. Carey, and J. Sandelin, *SIAM Journal on Numerical Analysis*, 54 (2016), 2729-3122
 68. *Exploration of efficient reduced-order modeling and a posteriori error estimation*, J. H. Chaudhry, D. Estep, M. Gunzburger, *International Journal on Numerical Methods for Engineering*, 111 (2016), 102-122
 69. *A stochastic inverse problem for multiscale models*, N. Panda, T. Butler, D. Estep, L. Graham, and C. Dawson, *Journal for Multiscale Computational Engineering*, 15 (2017), 265-283
 70. *Efficient distribution estimation and uncertainty quantification for elliptic problems on domains with stochastic boundaries*, J. H. Chaudhry, N. Burch, D. Estep, *SIAM/ASA Journal on Uncertainty*

Quantification, 6 (2018), 1127-1150

71. *Adjoint methods for uncertainty quantification in applied computational electromagnetics: FEM scattering examples*, C. Key, A. Smull, B. M. Notaros, D. Estep, and T. Butler, *Invited Paper, Special Issue Advanced Computational Electromagnetic Methodologies and Techniques*, ACES Journal, February 2019, ISBN: 978-0-9960078-8-7
72. *A posteriori error estimation and adaptive discretization refinement using adjoint methods in CEM: A study with a one-dimensional higher-order FEM scattering example*, C. Key, A. Smull, D. Estep, T. Butler, and B. M. Notaros, *IEEE Transactions on Antennas and Propagation* 68 (2020), 3791-3806.
73. *Adjoint-based accelerated adaptive refinement in frequency domain 3-D finite element method scattering problems*, J. Harmon, C. Key, D. Estep, T. Butler, and B. M. Notaros, *IEEE Transactions on Antennas and Propagation*, 2020, to appear.
74. *Error estimation and uncertainty quantification for first time to a threshold value*, J. H. Chaudhry, D. Estep, Z. Stevens, S. Tavener, *BIT Numerical Mathematics*, 2020, to appear

PEER-REVIEWED RESEARCH MONOGRAPHS

1. *Estimating the error of numerical solutions of systems of nonlinear reaction-diffusion equations*, D. Estep, M. Larson and R. Williams, *Memoirs of the American Mathematical Society* 696 (2000), 1-109

PEER-REVIEWED CONFERENCE PAPERS

1. *Adaptive methods for reaction diffusion problems*, D. Estep, M. Larson and R. Williams, *Proceedings of the 12th Annual Review of Progress in Applied Computational Electromagnetics*, 1996, 611-618
2. *The formation of shear layers in a fluid with temperature-dependent viscosity*, D. Estep, S. Verduyn Lunel, and R. Williams, *Equadiff 03, International Conference on Differential Equations, Hasselt 2003*, World Scientific, Singapore, 2004
3. *Introducing FACETS, the Framework Application for Core-Edge Transport Simulations*, J. R. Cary, J. Candy, R. H. Cohen, S. Krasheninnikov, D. C. McCune, D. J. Estep, J. Larson, A. D. Malony, P. H. Worley, J. A. Carlsson, A. H. Hakim, P. Hamill, S. Kruger, S. Muzsala, A. Pletzer, S. Shasharina, D. Wade-Stein, N. Wang, L. McInnes, T. Wildey, T. Casper, L. Diachin, T. Epperly, T. D. Rognlien, M. R. Fahey, J. A. Kuehn, A. Morris, S. Shende, E. Feibush, G. W. Hammett, K. Indireskumar, C. Ludescher, L. Randerson, D. Stotler, A. Yu Pigarov, P. Bonoli, C. S. Chang, D. A. D'Ippolito, P. Colella, D. E. Keyes, R. Bramley, J. R. Myra, *Journal of Physics: Conference Series* 78 (2007), 1-6
4. *First results from core-edge parallel composition in the FACETS project*, J. R. Cary, J. Candy, R. H. Cohen, S. Krasheninnikov, D. C. McCune, D. J. Estep, J. Larson, A. D. Malony, P. H. Worley, J. A. Carlsson, A. H. Hakim, P. Hamill, S. Kruger, M. Mia, S. Muzsala, A. Pletzer, S. Shasharina, D. Wade-Stein, N. Wang, S. Balay, L. McInnes, H. Zhang, T. Casper, L. Diachin, T. Epperly, T. D. Rognlien, M. R. Fahey, J. Cobb, A. Morris, S. Shende, G. W. Hammett, K. Indireskumar, D. Stotler, A. Yu Pigarov, *Journal of Physics: Conference Series* 125 (2008), 1-5
5. *A posteriori error analysis of multiscale operator decomposition methods for multiphysics models*, D. Estep, V. Carey, V. Ginting, S. Tavener, T. Wildey, *Journal of Physics: Conference Series* 125 (2008), 1-16
6. *Continuum modeling and control of large mobile networks*, Y. Zhang, E. K. P. Chong, J. Hannig, and D. Estep, *Proceedings of the 49th Annual Allerton Conference on Communication, Control and Computing*, Illinois, 2011, 1670-1677
7. *Adjoint methods for uncertainty quantification in applied computational electromagnetics: FEM scattering examples*, C. Key, A. Smull, B. M. Notaros, D. Estep, and T. Butler, *Proceedings of the 2018 International Applied Computational Electromagnetics Society (ACES) Symposium* –

ACES2018, March 25–29, 2018, Denver, Colorado, USA

8. *A posteriori element-wise error quantification for FEM solvers using higher order basis functions*, C. Key, A. Smull, D. Estep, T. Butler, and B. M. Notaros, *Proceedings of the 2018 IEEE International Symposium on Antennas and Propagation*, July 8–13, 2018, Boston, MA, USA, pp. 1319–1320
9. *Applications of adjoint solutions for predicting and analyzing numerical error of forward solutions based on higher order finite element modeling*, B. M. Notaros, C. Key, A. Smull, D. Estep, and T. Butler, *Proceedings of the 14th International Workshop on Finite Elements for Microwave Engineering – FEM2018*, September 10-14, 2018, Cartagena de Indias, Colombia, pp. 3–4
10. *Adjoint-based a posteriori error estimation and its applications in CEM: DHO FEM techniques and 3D scattering problems*, J. Harmon, C. Key, B. Troksa, T. Butler, D. Estep, and B. M. Notaros, *Proc. 2019 USNC-URSI National Radio Science Meeting*, January 9-12, 2019, Boulder, Colorado
11. *Adjoint-based uncertainty quantification in frequency-domain double higher-order FEM*, J. Harmon, C. Key, B. M. Notaros, D. Estep, and T. Butler, *Proceedings of the 2019 International Applied Computational Electromagnetics Society (ACES) Symposium – ACES2019*, April 15–19, 2019, Miami, Florida, USA
12. *Overview of some advances in higher order frequency-domain CEM techniques*, B. M. Notaros, S. B. Manic, C. Key, J. Harmon, and D. Estep, *Invited Paper, Special Session Advances in Frequency-Domain CEM Techniques and Applications*, accepted for the *21st International Conference on Electromagnetics in Advanced Applications – ICEAA 2019*, September 9-13, 2019, Granada, Spain
13. *Error estimation and uncertainty quantification based on adjoint methods in computational electromagnetics*, B. M. Notaros, J. Harmon, C. Key, D. Estep, and T. Butler, *Invited Paper, Special Session Applications of Machine/Deep Learning and Uncertainty Quantification Techniques in Computational Electromagnetics*, accepted for *2019 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting – AP-S/URSI 2019*, July 7–12, 2019, Atlanta, GA

ACADEMIC BOOKS AND BOOK CHAPTERS

1. *Computational Differential Equations*, K. Eriksson, D. Estep, P. Hansbo, and C. Johnson, Cambridge University Press, 1996 (in second printing)
2. *Practical Analysis in One Variable*, D. Estep, Undergraduate Textbooks in Mathematics, Springer-Verlag, 2002 (German Edition, 2004)
3. *Applied Mathematics: Body and Soul*, Volumes I, II, III, K. Eriksson, D. Estep and C. Johnson, Springer-Verlag, 2003 (German Edition, 2004)
4. *Bridging the Scales in Science and Engineering*, Editor J. Fish, Oxford University Press, Ch. 11: pages 305-387, *Error Estimation for Multiscale Operator Decomposition for Multiphysics Problems*, D. Estep, 2010
5. *Building Confidence in Computational Models: The Science of Verification, Validation, and Uncertainty Quantification*, Committee on Mathematical Foundations of Verification, Validation, and Uncertainty Quantification, The National Academies Press, 2012, *Appendix B: Adjoint Operators*, D. Estep.
6. *Practical Analysis in Many Variables*, D. Estep, under contract with SIAM
7. *A Ramble Through Probability: How I Learned to Stop Worrying and Love Measure Theory*, T. Butler, D. Estep, and N. Panda, under contract with SIAM

NON-REFEREED ARTICLES

1. *Boundedness of dispersive difference schemes via a normal form analysis*, D. Estep, *Proceedings of the Third International Conference on Hyperbolic Problems*, 1990

2. *CSE 2009: Graduate Education in CSE - Structure for the Zoo?* H.-J. Bungartz and D. Estep, in SIAM News 42, 2009
3. *Computational Science and Engineering Education: SIAM's Perspective*, H.-J. Bungartz, D. Estep, U. Rude, and P. Turner, IEEE Computing in Science and Engineering 11 (2009), 5-11
4. Interview, SIAM News 43 (2010)

PUBLIC SOFTWARE

1. *CARDS (Ordinary Differential Equation Solver)*, version 3.3, 1994, D. Estep and R. Williams
2. *CARDS (Concurrent Adaptive Reaction-Diffusion Solver)*, version 2.0, 1996, D. Estep and R. Williams
3. *FETkLab (Finite Element Toolkit for solving nonlinear elliptic systems in MATLAB)*, 2001-, D. Estep, M. Holst, D. Mikulencak
4. *GAASP (Globally Accurate, Adaptive Sensitivity Package)*, 2006-, D. Estep, B. Mckeown, D. Neckels, J. Sandelin

NONACADEMIC BOOKS

I have written and ghostwritten around twelve children books at the early reader level and lower.

CITATIONS (GOOGLE SCHOLAR 7/2019)

4,184 Citations; h-index 26; i10-index 60

DOCTORAL STUDENTS

1. W. Kuhn, School of Mathematics, Georgia Institute of Technology, 1997, Thesis: *Rigorous and reasonable error bounds for the numerical solution of dynamical systems*
2. M. Larson, Department of Mathematics, Chalmers University of Technology, 1997, Thesis: *Analysis of adaptive finite element methods* (acted as partial advisor with C. Johnson). Currently, Professor in Applied Mathematics at Umea University, Sweden.
3. M. Warner, School of Aerospace Engineering, Georgia Institute of Technology, 1997, Thesis: *Numerical Solutions to Optimal-Control Problems by Finite Elements in Time with Adaptive Error Control* (acted as partial advisor with D. Hodges).
4. D. Mikulencak, School of Chemical Engineering, Georgia Institute of Technology, 2001, Thesis: *Inertial Effects in Dilute Suspensions* (acted as partial advisor with J. Morris). Currently, Shell Exploration & Production.
5. S. Eastman, Department of Mathematics, Colorado State University, 2005, Thesis: *Analysis and Application of the Nonlinear Power Method*. Currently, associate professor at Armstrong Atlantic State University.
6. D. Neckels, Department of Mathematics, Colorado State University, 2005, Thesis: *Variational Methods for Uncertainty Quantification*. Currently, GeoEye, Inc.
7. J. Sandelin, Department of Mathematics, Colorado State University, 2006, Thesis: *Global Estimate and Control of Model, Numerical, and Parameter Error*. Currently, GeoEye, Inc.
8. T. Wildey, Department of Mathematics, Colorado State University, 2007. Thesis: *A Posteriori Analysis of Operator Decomposition on Interface Problems*. Currently, Research Staff Member, Sandia National Laboratories, Albuquerque.
9. S. Lee, Department of Mathematics, Colorado State University, 2008. Thesis: *An Adaptive Algorithm for an Elliptic Optimization Problem, and Stochastic-Deterministic Coupling: A Mathematical Framework*, Currently, associate professor, Department of Mathematics, Viterbo University.

10. T. Butler, Department of Mathematics, Colorado State University, 2009. Thesis: *Computational Measure Theoretic Approach to Inverse Sensitivity Analysis: Methods and Analysis*. Currently, assistant professor, University of Colorado Denver
11. M. Buzby, Department of Mathematics, Colorado State University 2009. Thesis: *Short Time Analysis of Deterministic ODE Solutions and the Expected Value of a Corresponding Birth-Death Process*. Currently, associate professor, Department of Mathematics, University of Alaska Southeast.
12. W. Newton, Department of Mathematics, Colorado State University, 2011, *A Posteriori Error Estimates for the Poisson Problem on Closed, Two-Dimensional Surfaces*. Currently, Total Benchmark Solution
13. N. Burch, Department of Mathematics, Colorado State University, 2011, *Probabilistic Foundation of Nonlocal Diffusion and Formulation and Analysis for Elliptic Problems on Uncertain Domains*. Currently, assistant professor, Gonzaga University
14. B. Bugbee, co-advisor (Advisor, J. Breidt), Department of Statistics, Colorado State University, 2015. *Semiparametric Regression in the Presence of Complex Variance Structures Arising from Small Angle X-Ray Scattering Data*. Currently, postdoc, MD Anderson Cancer Center
15. L. Yang, Department of Statistics, Colorado State University, 2018. *Infinite Dimensional Stochastic Inverse Problems*. Currently, Nanostring Technology, Inc.
16. C. Vollmer, Department of Statistics, Colorado State University, 2019. *Statistical Upscaling of Stochastic Forcing in Multiscale, Multiphysics Modeling*, Currently, Sandia National Laboratories
17. J. Chi, Department of Statistics, Colorado State University, in progress

POSTDOCS AND RESEARCH SCIENTISTS

1. M. Laforest, 2002. Full professor, Montreal Polytechnique
2. A. Malqvist, 2007. Full professor, Chalmers University, Sweden
3. V. Ginting, 2007. Professor, University of Wyoming
4. D. Lockwood, 2007. Instructor, Colorado State University.
5. D. Pham, 2009, Assistant Professor, University of Texas at San Antonio
6. H. Wang, 2009
7. J. Sandelin, 2010. GeoEye, Inc.
8. M. Presho, 2011. Assistant professor, Southeast Missouri State University
9. V. Carey, 2012. Assistant professor, University of Colorado at Denver
10. T. Butler, 2013. Assistant professor, University of Colorado at Denver
11. J. Collins, 2014. Assistant professor, University of Mary Washington
12. J. Hameed, 2014. Assistant professor, University of New Mexico
13. B. Sheehan, 2014. Teaching assistant professor, University of Reno
14. R. Mckeown, 2015. Data assimilation scientist, SPIRE
15. W. Newton, 2016. Total Benchmark Solution
16. N. Panda, 2017. Postdoc, Los Alamos National Laboratory.
17. S. Matthis, 2020. Naval Nuclear Laboratory.

INVITED SHORT COURSES AND MINITUTORIALS

- 7/04 *A Short Course on Duality, Adjoint Operators, Green's Functions, and A Posteriori Error Analysis*, Sandia National Laboratories, Albuquerque, New Mexico

- 4/07 *Duality, Adjoint Operators, and Uncertainty in a Complex World*, 4th Montreal Scientific Computing Days, University of Montreal, Montreal, Canada
- 3/14 *A Posteriori Error Estimates for Statistical Computations with Differential Equations with Stochastic Parameters*, SIAM Conference on Uncertainty Quantification, Savannah, Georgia
- 7/15 *Minitutorial on adjoint based a posteriori error estimation*, Rocky Mountain Summer Workshop on Uncertainty Quantification, University of Colorado Denver
- 6/16 *Short course on a new approach to stochastic inverse problems for scientific inference*, Rocky Mountain Mathematics Consortium Summer Workshop, 2016
- 11/16 *Short course on a new approach to stochastic inverse problems for scientific inference*, Computational Mathematics, Department of Mathematical Sciences, Chalmers University of Technology, Gothenburg, Sweden
- 1/17 *Short Course on Duality, Adjoint, and A Posteriori Error Estimation*, Wright Patterson Air Force Base, Dayton, Ohio

INVITED TALKS AT CONFERENCES AND WORKSHOPS

- 7/92 *LMS Symposium on Evolutionary Problems*, University of Durham, England
- 6/95 *HBK70: Conference in Honor of H. Keller*, California Institute of Technology
- 8/95 *American Mathematical Society Summer Conference*, Park City, Utah
- 3/96 *12'th Annual Review of Progress in Applied Computational Electromagnetics*, Naval Postgraduate School
- 6/96 *International Conference on Differential Equations and Dynamical Systems*, Missouri State University
- 4/97 *A.M.S. Regional Meeting: Special Session on Numerical Solutions of Differential Equations*, University of Maryland
- 11/97 *Dynamics of Algorithms*, I.M.A., University of Minnesota
- 3/98 *Mittag-Leffler Seminar*, Mittag-Leffler Institute, Sweden
- 3/98 *Workshop on Adaptive Methods for Differential Equations*, Royal Institute of Technology, Sweden
- 11/98 *Adaptive Finite Element Methods for Optimization '98*, University of Heidelberg
- 5/00 *Finite Elements in Fluid Problems 2000 Conference*, University of Texas at Austin
- 12/01 *Computational Challenges in Dynamical Systems*, Fields Institute, Canada
- 9/02 *International Conference on Computational and Mathematical Methods in Science and Engineering (CMMSE 2002)*, Alicante, Spain, *Plenary Address*
- 11/02 *A.M.S. Regional Meeting, Special Session on Numerical Methods for Differential Equations*, Orlando, Florida
- 7/03 *Seventh U.S. National Congress on Computational Mechanics*, Albuquerque, New Mexico
- 3/04 *Emerging Methodologies and Applications in Numerical PDEs*, Florida State University
- 3/04 *Self-Adaptive Methods in PDEs*, Oberwolfach, Germany, *Survey Lecture*
- 3/04 *Multi-physics Solution Methods*, Copper Mountain Conference on Iterative Methods
- 12/04 *CSRI Workshop on Multiscale Mathematics*, Sandia National Laboratories
- 2/05 *Symposium on A Posteriori Error Estimation Methods for Large-Scale Problems*, SIAM Conference on Computational Science and Engineering, Orlando, Florida
- 2/05 *Symposium on Innovative Time Integration Methods for Scientific Simulations*, SIAM Conference on Computational Science and Engineering, Orlando, Florida
- 4/05 *Workshop on Finite Element Modeling and Large Scale Calculations*, U.S. Army Engineer Research and Development Center, Vicksburg

- 6/05 *Third M.I.T. Conference on Computational Fluid and Solid Mechanics*, Massachusetts Institute of Technology, *Keynote Lecture*
- 6/05 *International Conference on Computational and Mathematical Methods in Science and Engineering*, Alicante, Spain, *Keynote Lecture*
- 7/05 *Foundations of Computational Mathematics*, Santander, Spain, *Semi-Plenary Lecture*
- 1/06 *Numerical Simulation of Flow in Porous Media*, *Joint Mathematics Meetings*, San Antonio, Texas
- 1/06 *Preparing Mathematics Students for Interdisciplinary Research*, *Joint Mathematics Meetings*, San Antonio, Texas
- 2/06 *Workshop on Computational Homology and Material Science*, Georgia Tech
- 8/06 *Junior Faculty Forum*, National Center for Atmospheric Research
- 9/06 *International Conference on Computational and Mathematical Methods in Science and Engineering*, Madrid, Spain, *Plenary Lecture*
- 2/07 *SIAM Conference on Computational Science and Engineering*, *Minisymposium on A Posteriori Error Estimation and Adaptivity in Computational Science and Engineering*
- 3/07 *14th International Finite Elements in Flow Problems Conference*, Santa Fe, New Mexico
- 8/07 *Sandia CSRI Workshop on Mathematical Methods for Verification and Validation*, Albuquerque, New Mexico
- 9/07 *Management of Numerical Errors In Nuclear Systems Modeling*, Idaho National Laboratory and North Carolina State University, North Carolina
- 7/08 *SIAM Annual Meeting*, *Minisymposium on Recent Advances on A Posteriori Error Estimation and Adaptive Error Control* and *Minisymposium on Advances in Uncertainty Quantification*
- 7/08 *SCIDAC 2008*, Seattle, Washington, *Plenary Address*
- 7/08 *Uncertainty Analysis in Complex, Multiphysics Applications*, *PSAAP University Alliance Center*, Stanford University
- 9/08 *Workshop on Mathematical and Computational Issues in the Solid Earth Geosciences*, *Computational Infrastructure for Geosciences*, Santa Fe
- 1/09 *Finite Element Methods in Engineering and Science*, Lake Tahoe, *Plenary Speaker*
- 2/09 *Pikes Peak Regional Undergraduate Mathematics Conference (PPRUMC)*, *Keynote Speaker*
- 4/09 *Computational Science and Engineering (CSE) Annual Research Symposium*, University of Illinois, Urbana-Champaign, *Keynote Speaker*
- 7/09 *SIAM Annual Meeting*, *Minisymposium on Predictive Computational of Multiscale-Multiphysics Applications*, Denver
- 8/09 *Workshop on Simulating the Spatial-Temporal Patterns of Anthropogenic Climate Change*, Los Alamos Institute for Advanced Studies, Santa Fe, New Mexico
- 11/09 *Adaptive and Multilevel Methods for Partial Differential Equations*, University of California San Diego
- 3/11 *SIAM Computational Science and Engineering Conference*, *Minisymposia on Numerical Discretization Error Estimation for Uncertainty Quantification*, *Progress in Computational Methods and Software for Tightly-coupled Multiphysics Applications*, *Numerical Methods for Stochastic Computation and Uncertainty Quantification*, *Numerical Challenges in Microstructure Modeling for Materials Science*, Reno, Nevada
- 8/11 *ICiS Workshop on Multiphysics Simulations: Challenges and Opportunities*, Park City, Utah, *Plenary Speaker*
- 5/12 *Uncertainty Quantification for High-Performance Computing Workshop*, Oak Ridge National Laboratory
- 7/12 *6th International Conference on Automatic Differentiation*, Fort Collins, CO

- 8/12 *Joint Statistical Meetings*, Invited Papers, Uncertainty Quantification at SAMSI
 5/13 *Workshop on Reduced Order Modeling in General Relativity*, Caltech, *Plenary Talk*
 7/14 *SIAM Annual Meeting*, *Invited Talk*
 12/15 *Fisk Distinguished Lecture*, Department of Mathematics, University of Wyoming
 2/16 *Research Collaboration Workshop: Optimization and Uncertainty Quantification in Energy and Industrial Applications*, Institute for Mathematics and its Applications, University of Minnesota, *Invited Talk*
 1/17 *Mathematics for Measurement*, International Centre for Mathematical Sciences, Edinburgh, Scotland, *Keynote Talk*
 6/17 *27th Biennial Conference on Numerical Analysis*, University of Strathclyde, Glasgow, Scotland, *Plenary Talk*
 10/17 *SIAM Central States Section Meeting*, Colorado State University, Fort Collins, *Plenary Talk*
 10/19 *NSF Computational Mechanics Vision Workshop*, Ann Arbor, *Invited Talk*

SEMINARS AND COLLOQUIA

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|-------|---|-------|--|
| 2/87 | University of New Mexico | 11/01 | University of Colorado at Boulder |
| 2/87 | Georgia Institute of Technology | 1/03 | University of Minnesota |
| 6/88 | Chalmers University of Technology | 3/03 | Arizona State University |
| 6/89 | Chalmers University of Technology | 4/03 | ICES, University of Texas |
| 11/89 | Emory University | 4/03 | University of Wyoming |
| 5/90 | Chalmers University of Technology | 2/04 | Sandia National Laboratories |
| 3/91 | Lawrence Livermore National Laboratory | 10/04 | ICES, University of Texas |
| 3/91 | University of Chicago | 1/05 | National Center for Atmos. Research |
| 5/91 | Chalmers University of Technology | 2/05 | University of Maryland |
| 6/91 | University of Hanover | 3/05 | CIRA, Colorado State University |
| 1/92 | California Institute of Technology | 4/05 | Tufts University |
| 5/92 | Stanford University | 11/05 | University of Minnesota |
| 11/92 | California Institute of Technology | 11/05 | Los Alamos Laboratory |
| 2/93 | Temple University | 12/05 | University of California at San Diego |
| 2/93 | Virginia Polytechnic Institute | 2/06 | Florida State University |
| 3/93 | University of South Carolina | 4/06 | University of Tennessee at Knoxville |
| 4/93 | Swedish Royal Institute of Technology | 4/06 | University of Delaware |
| 4/93 | Chalmers University of Technology | 11/06 | North Carolina State University |
| 5/93 | University of Cincinnati | 11/06 | University of North Carolina |
| 2/94 | University of California at Los Angeles | 4/07 | University of Texas at Austin |
| 4/94 | Oxford University | 8/07 | Idaho National Laboratory |
| 4/94 | Cambridge University | 10/07 | Lawrence Livermore National Laboratory |
| 5/94 | Chalmers University of Technology | 12/07 | Columbia University |
| 8/94 | Chalmers University of Technology | 2/08 | Natural Resource Ecology Laboratory |
| 9/94 | Swedish Royal Institute of Technology | 2/08 | Rensselaer Polytechnic Institute |
| 11/94 | University of Maryland, College Park | 9/08 | University of Colorado at Boulder |
| 2/95 | Tufts University | 12/08 | Idaho National Laboratory |
| 8/95 | Chalmers University of Technology | 9/09 | University of Wyoming |
| 11/96 | North Carolina State University | 12/09 | Lawrence Livermore National Laboratory |

12/96	California Institute of Technology	1/10	Atmospheric Sciences, CSU
12/96	Chalmers University of Technology	2/10	University of Wisconsin
10/97	Bell Labs, Lucent Technology	3/10	Brown University
12/97	University of California at Irvine	3/10	University of Chicago
5/98	Tufts University	8/10	Sandia National Laboratory
3/99	Oxford University	9/10	Lawrence Livermore National Laboratory
3/99	Centrum voor Wiskunde en Informatica	9/10	Purdue University
4/99	California State University at Chico	11/10	North Carolina State University
4/99	California Institute of Technology	1/11	Lawrence Livermore National Laboratory
4/99	University of California at Los Angeles	3/11	University of Southern California
10/99	University of Colorado at Boulder	11/11	University of Chicago
10/99	Colorado State University	3/12	Florida State University
11/99	University of Maryland, College Park	4/12	Colorado School of Mines
1/00	Duke University	4/12	SAMSI
11/00	University of Colorado at Denver	11/14	Chalmers University of Technology
2/01	Colorado School of Mines	1/14	Chalmers University of Technology
2/01	University of California at San Diego	3/14	KTH Royal Institute of Technology
1/00	North Carolina State University	3/14	Chalmers University of Technology
2/00	Colorado State University	9/14	University of Colorado Boulder
3/00	University of California at San Diego	10/15	Ohio State University
4/00	Tufts University	6/17	University of North Carolina
4/01	Sandia National Laboratories	12/17	University of California San Diego
9/00	Chalmers University of Technology	11/18	Simon Fraser University
10/00	Georgia Institute of Technology	10/1	University of New Brunswick
10/05	Penn State University	11/19	CRM, Université du Québec à Montréal
2/01	Lawrence Livermore National Laboratory	3/20	Wilfrid Laurier University
5/01	Cambridge University		
9/01	Sandia National Laboratories		

RESEARCH FUNDING (AWARDED)

- 1989 National Science Foundation, \$46,000, contributor, *Mathematical Sciences Computing Research Environment*
- 1992 National Science Foundation, \$30,000, co-principal investigator, *Mathematical Sciences Computing Research Environment*
- 1993-95 National Science Foundation, Division of Mathematical Sciences, \$37,132, principal investigator, *Adaptive numerical methods for singularly-perturbed reaction-diffusion equations*
- 1993-95 National Science Foundation, \$38,696, principal investigator, *International Research Fellow*
- 1995-98 National Science Foundation, Division of Mathematical Sciences, \$57,000, principal investigator, *Computational error estimation and adaptive error control for numerical methods for differential equations*
- 1995 National Science Foundation, Division of Mathematical Sciences, \$8,200, co-principal investigator, *Georgia Tech Conference on Dynamical Numerical Analysis*
- 1995 Institute for Mathematics and Its Applications, \$4,000, co-principal investigator, *Georgia Tech Conference on Dynamical Numerical Analysis*

- 1997-99 North Atlantic Treaty Organization, \$4,000, co-principal investigator, *Investigations of systems of reaction diffusion equations*
- 1998-01 National Science Foundation, Division of Mathematical Sciences, \$78,400, principal investigator, *Computational error estimation and adaptive error control for numerical methods for differential equations*
- 2000 Institute for Mathematics and Its Applications, \$4,000, co-principal investigator, *Southeastern Conference on Applied Mathematics*
- 2001 National Science Foundation, Division of Mathematical Sciences, \$12,600, co-principal investigator, *Workshop on the Preservation of Stability under Discretization*
- 2001 International Business Machines, Inc., Shared University Research Program Grant Program, \$197,498, co-author of original proposal submitted to I.B.M. partner organization,
- 2001-05 National Science Foundation, Division of Mathematical Sciences, \$182,122, principal investigator, *Computational error estimation and adaptive error control for multi-scaled differential equations*
- 2001 National Science Foundation, Division of Mathematical Sciences, \$23,310, co-principal investigator, *Intermountain/Southwest Conference on Industrial and Interdisciplinary Mathematics*
- 2001-03 Sandia Corporation, \$36,611, principal investigator, *High resolution methods for ALEGRA*
- 2003-09 National Science Foundation, IGERT Program, \$3,261,000, principal investigator, principal co-author of pre-proposal and proposal, *PRIMES: Program for Interdisciplinary Mathematics, Ecology, and Statistics*
- 2003-08 United States Department of Agriculture, \$75,702, principal investigator, *Population genetic analyses to preserve genetic resources of crops*
- 2003-08 National Aeronautics and Space Administration, \$1,400,000, co-principal investigator, *Carbon data assimilation modeling: remote sensing and field observational constraints of earth system carbon analysis*
- 2004 Sandia Corporation, \$49,913, principal investigator, *A posteriori analysis and adaptive error control for operator splitting methods for partial differential equations*
- 2004-09 National Science Foundation, Mathematical and Statistical Tools for Understanding Complex Systems in the Environment, \$499,989, principal investigator, *Novel a posteriori analysis of ecological models: the carbon cycle*
- 2004-09 Department of Energy, Office of Science, \$940,972, principal investigator, *A posteriori analysis of interface effects in the discretization of multi-scaled and multi-physics problems by decomposition techniques*
- 2005-06 National Science Foundation, Division of Mathematical Sciences, \$16,650, co-principal investigator, *Workshop on Geometry and Symmetry in Numerical Computation*
- 2005-09 Department of Energy, Office of Science, \$2,300,000 (CSU portion \$214,000), principal investigator, *A mathematical analysis of atomistic-to-continuum (AtC) multiscale coupling methods*
- 2007-12 Department of Energy, Office of Advanced Scientific Computing Research and Office of Fusion Energy Sciences, \$11,000,000 (CSU portion \$480,000), co-investigator, *FACETS*
- 2007-10 National Science Foundation, Power, Controls and Adaptive Networks, Division of Electrical, Communications and Cyber Systems, \$276,833, co-principal investigator, *Partial differential equation models for large networks*
- 2007-10 National Science Foundation, Division of Mathematical Sciences, \$300,000 (CSU portion \$148,000), principal investigator, *Finite element methods for discretizing geometric PDEs with nonlinear constraints and gauge freedom*

- 2007-12 National Science Foundation, Division of Biological Sciences, \$903,000, co-principal investigator, *Towards a flexible and extendable scientific undergraduate experience (FEScUE): Blending mathematics and the life sciences*
- 2007-09 Idaho National Laboratory, Battelle Energy Alliance, LLC, \$249,253, principal investigator, *Adaptive modeling of geometrically complex fuel rods*
- 2008 Lawrence Livermore National Laboratory, \$25,000, principal investigator, *A Posteriori Error Calculation of hydrodynamics simulations using adjoint methodologies*
- 2009-12 Defense Threat Reduction Agency, \$432,000, principal investigator, *A Posteriori Error Analysis and uncertainty quantification for adaptive multiscale operator decomposition methods for multiphysics problems*
- 2009-11 Department of Energy, Office of Science, \$660,500 (CSU portion: \$226,000), principal investigator, *Collaborative Proposal: Transforming how climate system models are used: a global, multi-resolution approach to regional ocean modeling*
- 2009 Lawrence Livermore National Laboratory, \$30,894, principal investigator, *A Priori and A Posteriori analysis of smoothed particle hydrodynamics-finite element methods for pore-scale simulations*
- 2010-13 Lawrence Livermore National Laboratory, \$391,870, principal investigator, *Adjoint-based methods for uncertainty quantification*
- 2010-14 National Institutes of Health, \$1,229,249, co-principal investigator, *The inverse problem for estimation of structure of biological macromolecules from small-angle X-Ray scattering*
- 2010-13 Department of Energy, Office of Science, \$1,563,784 (CSU portion: \$307,425), principal investigator, *Enabling Predictive simulation and UQ of complex multiphysics PDE systems by the development of goal-oriented variational sensitivity analysis and a-posteriori error estimation methods*
- 2010-14 National Science Foundation, Division of Mathematical Sciences, \$160,000 (CSU Portion: \$80,000), co-principal investigator, *Collaborative Research: A posteriori error analysis and adaptivity for discontinuous interface problems*
- 2011 Multiscale Design Systems, LLC through Air Force SBIR Phase II, CSU subcontract: \$90,000, principal investigator
- 2011-14 Idaho National Laboratory, Battelle Energy Alliance, LLC, \$249,253, principal investigator, *Uncertainty analysis for multiscale models of nuclear fuel performance*
- 2011-12 Statistics and Applied Mathematical Sciences Institute, Duke University, \$43,200, principal investigator, *Memorandum of Understanding*
- 2011-16 National Science Foundation, Division of Mathematical Sciences, \$1,126,000 (CSU Portion: \$288,000), principal investigator, *FRG: error quantification and control for gravitational waveform simulation*
- 2011-16 Department of Energy, Nuclear Energy University Programs, \$1,098,250, principal investigator, *11-2031: Multiscale modeling and uncertainty quantification for nuclear fuel performance*
- 2012-16 National Science Foundation, Division of Mathematical Sciences, \$550,000 (CSU Portion: \$145,777), principal investigator, *Data-driven inverse sensitivity analysis for predictive coastal ocean modeling*
- 2012-18 Department of Energy, Office of Science, \$12,500,000 (CSU Portion \$1,000,000), co-principal investigator, *DiaMonD: An integrated multifaceted approach to mathematics at the interfaces of data, models, and decisions*
- 2014-15 Dynamics Research Corporation, \$205,619, principal investigator, *Uncertainty Quantification for HPCMP CREATE*

- 2016-21 Riverside Research Organization, \$744,882, principal investigator, *Development of Uncertainty Quantification and Design Approaches and Solutions*
- 2017-20 National Science Foundation, Division of Mathematical Sciences, \$312,062 (CSU Portion: \$211,902), co-principal investigator, *Collaborative Research: A posteriori Error Analysis for Complex Models with Applications to Efficient Numerical Solution and Uncertainty Quantification*
- 2018-23 USDA, Forest Service, \$112,506, principal investigator, *Cooperative Research in Ecological Statistics*
- 2018-21 National Science Foundation, Division of Mathematical Sciences, \$356,000 (CSU Portion: \$81,000), principal investigator, *Collaborative Research: Construction and analysis of numerical methods for stochastic inverse problems with application to coastal hydrodynamics*
- 2018-21 National Science Foundation, Division of Mathematical Sciences, \$260,000 (CSU Portion: \$180,000), co-principal investigator, *Collaborative Research: Efficient coupling of multilevel PDE solvers and advanced sampling methods*
- 2020-25 National Sciences and Engineering Research Council, Discovery Grant Program, \$185,000, principal applicant, *Tools for the investigation of stochastic multiphysics models*
- 2020-27 National Sciences and Engineering Research Council, Canada Research Chair, \$1,400,000, *Computational Probability and Uncertainty Quantification*

CONFERENCES ORGANIZED

- 1995 *Georgia Tech Conference on Dynamical Numerical Analysis*, with L. Dieci
- 1996 *Georgia Tech Workshop on Computation*, with S. Jin
- 1997 *CBMS Regional Conference on the Theory of Shock Waves*, with S. Jin
- 1999 *Minisymposium on Numerical Methods for Multiscale Differential Equations*, SIAM Annual Meeting, with S. Jin
- 2001 *Workshop on the Preservation of Stability under Discretization*, with S. Tavener
- 2001 *Southeast Conference on Applied Mathematics*, with P. Gremaud, J. Pelesko, H. Tran
- 2002-4 *Annual Intermountain/Southwest Conference on Interdisciplinary and Industrial Mathematics*, with D. Armbruster, E. Stone, S. Tavener
- 2003 *PRIMES Workshop on Data Model Fusion*, with R. Davis
- 2004 *PRIMES Summer Workshop*
- 2005 *Educational Challenges and Innovations in Applied, Interdisciplinary, and Computational Mathematics*, Invited Minisymposium, *SIAM Annual Meeting*
- 2005 *Workshop on Geometry and Symmetry in Numerical Computation*, with C. Peterson, A. Sommese, S. Tavener
- 2006 *International Conference on Computational and Mathematical Methods in Science and Engineering*, Madrid, Spain
- 2007 *SIAM Conference on Computational Science and Engineering* invited minisymposium on *Graduate Education in Computational Science and Engineering*.
- 2007 *CSU Workshop on Small Angle X-ray Scattering in Biological Sciences*, with K. Luger and M. van der Woerd, Colorado State University
- 2008 *CSU Symposium on Imaging*, with O. Emanouilov, M. Kirby, and J. Mueller, Colorado State University
- 2008 *SIAM Annual Meeting*, invited minisymposium on *Computational Solution of Multiphysics Problems*, 6 sessions

- 2009 *SIAM Conference on Computational Science and Engineering*, invited minisymposium on *Graduate Education in Computational Science and Engineering – Needs, Trends, Risks, and Chances*
- 2009 *SIAM Annual Meeting, Organizing Committee*
- 2009 *Emerging Methods in Inverse Problems*, with J. Mueller, Colorado State University
- 2011 *SAMSI-Sandia Summer School on Uncertainty Quantification*, 2011, co-organizer with Jim Stewart, Sandia
- 2011 *Workshop on Working with Uncertainty, IEEE VisWeek 2011*, Program Committee
- 2011-12 *SIAM/ASA/USACM Conference on Uncertainty Quantification*, Co-chair
- 2016 *Workshop on Uncertainty Quantification*, Mittag-Leffler Institute, Stockholm, Sweden
- 2018 *Workshop on UQ for Inverse Problems in Complex Systems*, Isaac Newton Institute, Cambridge, United Kingdom, Principal Organizer
- 2019-20 *SIAM Conference on Uncertainty Quantification*, Program Committee

BOOKS EDITED

1. *Proceedings of the Georgia Tech Conference on Dynamical Numerical Analysis*, L. Dieci, D. Estep, E. Van de Velde, eds, Numerical Algorithms 14, 1997
2. *Collected Lectures on the Preservation of Stability under Discretization*, D. Estep and S. Tavener, Eds, SIAM, Philadelphia, 2002.

BOOKS REVIEWED

1. *Accuracy and Stability of Numerical Algorithms*, N. Higham, SIAM Review 45, 2003
2. *Mathematical Analysis: Approximation and Discrete Processes*, M. Giaquinta and G. Modica, SIAM Review, 47, 2005.
3. *Metric Spaces*, Satish Shirali and Harkrishan Vasudeva, SIAM Review 49, 2007

REFEREE SERVICE

- Referee for AIAA Journal of Guidance, Control, and Dynamics, Applicable Analysis, Applied Mathematics Letters, Applied Numerical Mathematics, BIT, Computer Methods in Applied Mechanics and Engineering, Computers & Mathematics with Applications, Computers and Structures, Communications in Numerical Methods in Engineering, IMA Journal on Numerical Analysis, International Journal of Mathematics and Mathematical Sciences, International Journal of Numerical Methods in Engineering, International Journal for Multiscale Computational Engineering, International Journal on Uncertainty Quantification, Journal of Applied Mathematics and Computing, Journal of Complexity, Journal of Computational and Applied Mathematics, Journal of Computational Mathematics, Journal on Computational Physics, Journal of Differential Equations, Journal of Microelectromechanical Systems, Mathematical Modeling and Numerical Analysis, Mathematical Models and Methods in Applied Science, Mathematics of Computation, Numerical Algorithms, Numerical Linear Algebra with Applications, Numerische Mathematik, Numerical Methods for Partial Differential Equations, RAIRO Modélisation Mathématique et Analyse Numérique, SIAM Journal on Numerical Analysis, SIAM Journal on Scientific Computing, SIAM Journal on Uncertainty Quantification, Transactions on Mathematical Software
- Reviewer for the National Science Foundation, Department of Energy, Army Research Office, Engineering and Physical Sciences Research Council of Great Britain, Council of Physical Sciences of the Netherlands Organization for Scientific Research, and the Deutsche Forschungsgemeinschaft
- 20 Review Panels for the National Science Foundation and Department of Energy, including CAREER, FRG, IGERT, RTG, IGMS, and ITR Programs
- Ph.D. Thesis Opponent for Johan Ivarsson, Department of Mathematics, Chalmers University of Technology, Sweden, 2001

- Reviewer, 2001 Distinguished Research Prize, Kuwait Foundation for the Advancement of Science
- Review Panel, 2003 Applied Mathematical Sciences, Department of Energy
- Reviewer, 2003 Utah State University Community-University Research Initiative Grant
- Referent for the Ph.D. thesis of Bart van de Rotten, Department of Mathematics, University of Leiden, 2003
- Review Panel, 2005 Fusion Simulation Project, Department of Energy
- Mathematics Review Panel, 2008, Texas Advanced Research Grants Program
- Review Panel, 2008, Fusion Simulation Prototype Centers, Department of Energy
- *Proposed Graduate Program in Computational Science at University of Texas at El Paso*, 2008. Review Committee for the Texas Higher Education Coordinating Board
- *University of California San Diego Interdisciplinary Graduate Program in Computational Science, Mathematics, and Engineering*, 2009. Proposal review
- Mathematics Review Panel, *Norman Hackerman Advanced Research Program*, Texas, 2009
- Reviewer, 2010, Fusion Simulation Prototype Centers, Department of Energy
- Reviewer, 2011, King Abdullah University of Science and Technology (KAUST) Strategic Research Initiative (SRI) program, Center Proposals
- Member, Sandia Computing and Information Sciences Review Panel, 2012-2015
- Panelist, Clusters of Excellence in Engineering Sciences, Deutsche Forschungsgemeinschaft, 2018

OTHER PROFESSIONAL SERVICE

- Co-Organizer, Second DOE Workshop on Multiscale Mathematics, 2004 Co-editor and co-author for final report
- Panel Co-Leader, *Panel on Validation, Verification, Uncertainty Analysis and Decision Optimization, Department of Energy Computational Subsurface Sciences Workshop*, 2007. Coordinator for Priority Research Direction report “Uncertainty Representation, Uncertainty Propagation, and Sensitivity Analysis for Subsurface System”. Contributor on two other Priority Research Direction reports.
- Breakout Lead and Report co-author, *Uncertainty Quantification/Stochastic Systems, Department of Energy Cross-Cutting Technologies for Computing at the Exascale*, 2010
- Invited participant, *Fusion Simulation Program Definition Workshop*, 2011
- Co-Author, *Proposal to establish a SIAM/ASA Journal on Uncertainty Quantification*, (with J. Berger and M. Gunzburger). Initially submitted to SIAM in 2010 and ASA in 2011, approved by ASA and SIAM in 2012.
- Co-Author, *Fostering Interactions Between the Geosciences and Mathematics, Statistics, and Computer Science*, Technical Report TR-2012-02, Department of Computer Science, University of Chicago, 2012
- Co-Author, *Multiphysics Simulations: Challenges and Opportunities*, Tech. Report ANL/MCS-TM-321, Argonne National Laboratory, 2011
- Panel Chair, Beyond Interpretive Simulations, *Fusion Energy Sciences and Advanced Scientific Computing Research Workshop on Integrated Simulations for Magnetic Fusion Sciences*. Co-Author of Workshop Report. Department of Energy Office of Sciences, 2015
- Participant, Department of Energy Office of Science *Study Group on Large Center Type Investment Mechanisms in Applied Mathematics*, 2016
- Participant, Workshop Report, Computational Mechanics Vision and Future Challenges Workshop, National Science Foundation, Ann Arbor, Michigan, 2020

- Panelist, An Ecosystem of Innovation, Data Science Nexus Conference, University of Manitoba, 2019

HIGHLIGHTS OF SERVICE AT GEORGIA INSTITUTE OF TECHNOLOGY

- 1989-00 External member, numerous Ph.D. committees for students from engineering and science
- 1997-98 Junior Promotions and Tenure Committee, School of Mathematics, Georgia Tech
- 1998-00 Hiring Committee, School of Mathematics, Georgia Tech
- 1998-00 First Director of Teaching Effectiveness, School of Mathematics, Georgia Tech (Created and coordinated adoption of the School's teaching development and evaluation policy for untenured faculty)

HIGHLIGHTS OF COLORADO STATE UNIVERSITY SERVICE

- 2000- External member, numerous Ph.D. committees for students from engineering and science, Georgia Tech and Colorado State University
- 2001 College of Natural Sciences, Research and Graduate Education Committee, Colorado State University
- 2002 Representative for the Department of Mathematics on the Search Committee for the Dean of the College of Natural Sciences of Colorado State University
- 2002 Virtual College of Information Sciences and Technology Strategic Planning Committee, chief author of the Research Plan, Colorado State University
- 2001-03 Designed and coordinated adoption of a new qualifying process for Ph.D. candidacy, Department of Mathematics, Colorado State University
- 2003 Chair of the Research Advisory Council and member of the Executive Committee, Information Science & Technology Center, Colorado State University
- 2003-09 Co-Director, Program for Interdisciplinary Mathematics, Ecology, and Statistics, Colorado State University
- 2003-06 Faculty Advisor, Colorado State University Rams Cycling Team, given the USA Cycling 2003 and 2007 Collegiate Cycling Team of the Year Award. Helped establish scholarship endowment fund.
- 2004-05 Hiring Committee, Department of Mathematics
- 2005- Graduate Curriculum Reform Committees for Applied Mathematics and Partial Differential Equations
- 2006- Director, Center for Interdisciplinary Mathematics and Statistics
- 2006-09 Graduate Committee, Department of Mathematics
- 2007- University Committee on Faculty Governance (Chair, 2009-2011, 2012-)
- 2007-10 Committee for Senior Promotion, Department of Mathematics
- 2008-10 Executive Committee, Department of Mathematics
- 2008-10 Associate Chair, Department of Mathematics
- 2008-9 Department Review Committee, Department of Mathematics
- 2009-10 Space Committee, Department of Mathematics
- 2010 Goals Committee, Department of Mathematics
- 2010 Department of Atmospheric Science University Review Committee
- 2010 University Review Committee for Oliver P. Pennock Distinguished Service Award
- 2010-11 Advisory Board for the Short Grass Steppe Research Innovation Center
- 2010 External Advisory Committee for NSF IGERT MAS BioEnergy Program
- 2010 University Search Committee for Associate Director of Sponsored Programs
- 2010 University Search Committee for Export Control Officer

- 2010 Council of Research Deans Committee on Interdisciplinary Issues in P&T
- 2010 - Graduate Student Committee, Department of Statistics
- 2010 -15 Promotion and Tenure Committee, Department of Statistics (Chair 2014-15)
- 2010- Award Nomination Committee, Department of Statistics
- 2011 Review Committee, Research Infrastructure: Core and Specialized Facilities
- 2011-12 Department Code Review Committee, Department of Statistics
- 2011-12 Organizing Committee, CSU Research Colloquium
- 2014 Scholarship Impact Award Committee
- 2014- PROPEL Committee, Office of VPR
- 2014-16 Associate Chair of Graduate Studies, Department of Statistics
- 2015 Review Committee, VPR Interdisciplinary Awards
- 2015 Scholarship Impact Award Committee
- 2015-16 Department Review Committee, Department of Statistics
- 2016 University Review Committee, Department of Electrical and Computer Engineering
- 2016-17 Hiring Committee, Department of Statistics
- 2017- Chair, Department of Statistics

COMMUNITY SERVICE

- 2004-06 President, Friends of RAMS Cycling, LLC., a nonprofit charity organization
- 2004-06 Co-Organizer, Horsetooth Double Dip Bicycle Challenge, a community bicycle tour that raised funds for Team Fort Collins (serving at-risk youths), scholarships for the CSU RAMS Cycling Team, and the Rist Canyon Volunteer Fire Department
- 2014-16 Treasurer, Rocky High School Hockey Club, established 501c3 tax status for club
- 2019 Treasurer, Rocky High School Girls Soccer

COURSES TAUGHT

- 1978-81 Teaching Assistant, Department of Mathematics, Columbia University
 - Conducted recitation sessions and graded for various levels of calculus
 - Tutor for undergraduate and returning adult students
- 1981-87 Graduate Teaching Assistant, Department of Mathematics, University of Michigan
 - Taught various courses in precalculus, calculus, and linear algebra at an average of 1 course per semester
 - Tutor for high school, undergraduate and graduate students
- 1987-01 Faculty member, School of Mathematics, Georgia Institute of Technology
 - MATH1507 Calculus I, 2 times
 - MATH1508 Calculus II, 5 times
 - MATH1509 Calculus III, 2 times
 - MATH1518* Honors Calculus I, 1 time
 - MATH1519* Honors Calculus II, 1 time
 - MATH1708 Precalculus, 2 times
 - MATH1711 Mathematics for Management, 1 time
 - MATH2508 Calculus V, 4 times
 - MATH2517* Honors Calculus IV, 1 time
 - MATH2518* Honors Calculus V, 1 time
 - MATH3709 Mathematics for Systems Engineering, 2 times
 - MATH4582 Advanced Engineering Mathematics, 2 times

MATH4640 Introduction to Scientific Computing I, 7 times
 MATH4641 Introduction to Scientific Computing II, 7 times
 MATH4800* Numerical Methods for Partial Differential Equations, 1 time
 MATH6341 Partial Differential Equations I, 1 time
 MATH6342 Partial Differential Equations II, 1 time
 MATH6343 Partial Differential Equations III, 2 times
 MATH6640 Numerical Methods for Partial Differential Equations, 3 times
 MATH6643 Numerical Linear Algebra, 3 times
 MATH6644 Numerical Solution of Nonlinear Equations, 1 time
 MATH6646 Numerical Methods for Ordinary Differential Equations, 1 time
 MATH6647* Theory of Numerical Methods for Partial Differential Equations, 4 times
 MATH8153* Numerical Methods for Dynamical Systems, 1 time
 Special Topics Courses in Numerical Methods for Differential Equations, 3 times
 Numerous reading courses

2001- Faculty member, Departments of Mathematics and Statistics, Colorado State University

MATH192 Freshman Seminar in the Mathematical Sciences, 1 time
 MATH340 Introduction to Ordinary Differential Equations, 1 time
 MATH495* FESCUE Team Research Course, 2 times
 MATH517* Introduction to Mathematical Analysis, 2 times
 MATH560 Linear Algebra, 1 time
 MATH617* Real Analysis I, 3 times
 MATH618 Real Analysis II, 3 times
 MATH651 Numerical Analysis II, 1 time
 MATH652* Finite Element Methods, 2 times
 EY680* TREE (Team-based Research in Ecology), 5 times
 MATH676 Special Topics in Functional Analysis, 1 time
 STAT421, Stochastic Processes, 1 time
 STAT521, Stochastic Processes, 4 times
 STAT525, Introduction to Time Series, 2 times
 STAT560/460, Applied Multivariate Statistics, 1 time
 STAT620(680)*, Introduction to Measure Theoretic Probability, 5 times
 STAT720, Probability Theory, 3 times
 STAT722, Stochastic Differential Equations, 1 time
 Numerical Methods for Uncertainty Quantification (SAMSI), 1 time
 Numerous reading courses

**Developed course*