Lucas Charles WILCOX

PERSONAL DATA

WORK ADDRESS:	Department of Applied Mathematics Naval Postgraduate School 833 Dyer Road; Building 232, SP-238B Monterey, California 93943 USA
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EDUCATION

MAY 2006	Doctor of Philosophy in APPLIED MATHEMATICS, **Brown University**, Providence, Rhode Island Thesis: *High-Order Accurate Methods for Solving the Time-Harmonic Maxwell's Equations* Adviser: Jan S. HESTHAVEN
MAY 2002	Master of Science in APPLIED MATHEMATICS, **Brown University**, Providence, Rhode Island
MAY 2001	Bachelor of Science in MATHEMATICAL AND COMPUTER SCIENCES, **Colorado School of Mines**, Golden, Colorado Major: Mathematical and Computer Sciences Area of Special Interest: Engineering Physics Graduated with high scholastic honors The outstanding graduating senior in the Mathematical and Computer Sciences Department
MAY 1997	High school diploma **Columbine High School**, Littleton, Colorado Graduated as valedictorian

WORK EXPERIENCE

PRESENT JUL 2021	Professor at DEPARTMENT OF APPLIED MATHEMATICS, NAVAL POSTGRADUATE SCHOOL, Monterey, California
JUL 2021 JUL 2016	Associate Professor at DEPARTMENT OF APPLIED MATHEMATICS, NAVAL POSTGRADUATE SCHOOL, Monterey, California
JUL 2016 SEP 2012	Assistant Professor at DEPARTMENT OF APPLIED MATHEMATICS, NAVAL POSTGRADUATE SCHOOL, Monterey, California
SEP 2012 JUL 2010	Member Technical Staff at HYPERCOMP, Westlake Village, California First project was to develop a high-order discontinuous Galerkin framework for CEM and CFD applications which runs on CPU and GPU based clusters. This includes developing a Maxwell's equations solver to be delivered to Naval Air Systems Command, Radar and Antenna Systems Division. Topics researched include reduced basis methods for CEM and absorbing boundary conditions for wave propagation.

MAY 2010 – SEP 2008 | Research Associate at INSTITUTE FOR COMPUTATIONAL ENGINEERING AND SCIENCES, UNIVERSITY OF TEXAS AT AUSTIN, Austin, Texas

Advised by Omar GHATTAS. Topics researched include large scale uncertainty quantification, and scalable algorithms for parallel high performance computing. Developed an adaptive high-order parallel discontinuous Galerkin library. Co-advised several Ph.D. students.

AUG 2008 – AUG 2006 | ICES Postdoctoral Fellow at INSTITUTE FOR COMPUTATIONAL ENGINEERING AND SCIENCES, UNIVERSITY OF TEXAS AT AUSTIN, Austin, Texas

Advised by Omar GHATTAS. Organized a weekly reading group studying uncertainty quantification and propagation. Topics researched include large scale uncertainty quantification, and scalable algorithms for parallel high performance computing. Developed an open-source parallel high-order nodal discontinuous Galerkin library being considered for use by Exxon. Co-advised several Ph.D. students.

AUG 2006 – MAY 2006 | Postdoctoral Researcher at BROWN UNIVERSITY, Providence, Rhode Island

Advised by Jan S. HESTHAVEN. Researched uncertainty propagation via stochastic collocation in full-vectorial Maxwell's discontinuous Galerkin equation solvers.

SEP 2005 – MAY 2005 | Research Assistant at COMPUTER SCIENCE RESEARCH INSTITUTE, SANDIA NATIONAL LABORATORIES, Albuquerque, New Mexico

Advised by S. Scott COLLIS and Bart G. VAN BLOEMEN WAANDERS. Integrated the Trilinos numerical solvers into an existing discontinuous Galerkin framework Sledge++. Added three dimensional support to Sledge++. Studied the use of adjoint based error estimation and *h*- and *p*-refinement in solving partial differential equations numerically.

MAY 2005 – JAN 2005 | Teaching Assistant at DIVISION OF APPLIED MATHEMATICS, BROWN UNIVERSITY, Providence, Rhode Island

Lead a weekly recitation section covering topics in a second course in elementary differential equations. Topics covered include systems of differential equations, nonlinear ordinary differential equations and partial differential equations.

SEP 2004 – MAY 2004 | Research Assistant at COMPUTER SCIENCE RESEARCH INSTITUTE, SANDIA NATIONAL LABORATORIES, Albuquerque, New Mexico

Advised by S. Scott COLLIS and Bart G. VAN BLOEMEN WAANDERS. Studied the use of adjoint based error estimation and *h*- and *p*-refinement in solving partial differential equations numerically.

DEC 2004 – MAY 2004 | Research Assistant at DIVISION OF APPLIED MATHEMATICS, BROWN UNIVERSITY, Providence, Rhode Island

Advised by Jan S. HESTHAVEN and Tim WARBURTON. Helped develop a high-order discontinuous Galerkin framework Sledge++ for solving partial differential equations.

SEP 2003 – MAY 2003 | Research Assistant at BELL LABORATORIES, LUCENT TECHNOLOGIES, Murray Hill, New Jersey

Advised by Dan FUCHS, Ronen RAPAPORT, and Gang CHEN. Used the multilayer boundary variation method to investigate periodic roughness in Bragg reflectors.

MAY 2004 – SEP 2001 | NSF VIGRE Graduate Student at DIVISION OF APPLIED MATHEMATICS, BROWN UNIVERSITY, Providence, Rhode Island

Researched Boundary variation methods for multilayer optical gratings. Investigated preconditioning for discontinuous Galerkin methods for the time-harmonic Maxwell's equations.

AUG 2001 – SEP 2000 | Research Assistant at DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES, COLORADO SCHOOL OF MINES, Golden, Colorado

Advised by William NAVIDI and Tracy CAMP. Worked on research in the area of location based routing in mobile ad hoc networks. Added routing functionality to the Berkeley NS2 simulator, which is written in C++/TCL.

AUG 2000 – MAY 2000 | Programmer at QWEST ADVANCED TECHNOLOGIES INC., Boulder, Colorado
Advised by Andy PAI. Programmed in JAVA adding functionality to a large mailbox provisioning system. Designed and implemented a graphical user interface to maintain business rules in a user permission database table.

AUG 1999 – JUN 1999 | Programmer at INTESSERA TECHNOLOGIES GROUP, Denver, Colorado
Scripted 4Test quality assurance automated test scripts.

AUG 1999 – JUN 1999 | Mathematical Consultant at KN ENERGY, Lakewood, Colorado
Simulated work environment for the Colorado School of Mines field session. Mathematically modeled the North American natural gas market. Included linear programming and scripting in AMPL.

AUG 1998 – MAY 1998 | Programmer at INTESSERA TECHNOLOGIES GROUP, Denver, Colorado
Included Perl scripting and work in Remedy, a help desk management system.

RESEARCH

Topics of Interest

Field of study: Generally classified as scientific computation with an emphasis on the numerical solution of partial differential equations using high-order methods.

Keywords: Discontinuous Galerkin, Spectral Elements, Finite Elements, Finite Volume, Finite Difference, Adaptive Mesh Refinement, Boundary Perturbations, Iterative Methods, Preconditioning, Adjoint Equations, Error Estimation, Inverse Problems, Uncertainty Propagation and Estimation, Large-Scale Parallel Computing, Maxwell's Equations, Electromagnetic Scattering, Mantle Convection, Seismic Waves, Ice Sheets

Synopsis: In the ***past***, wireless ad hoc network routing protocols, and the use of location information with wireless ad hoc networks constituted the focus of undergraduate research. Graduate research began with extending a boundary perturbation method for diffraction optics to handle multiple material layers. This solver was used alongside an analytical method to investigate grating depth effects in grating coupled waveguide sensors. Later ventures included the study of high-order hp-adaptive discontinuous Galerkin methods for solving the time-harmonic Maxwell's equations. Adjoint based error estimates were used to drive the adaptation of the computational mesh. ***Current*** avenues of research include developing methods for large-scale uncertainty quantification for inverse problems involving PDEs, the development of local time-stepping methods for discontinuous Galerkin methods, the development of parameter free absorbing boundary conditions, reduced basis methods, and the development of parallel adaptive discontinuous Galerkin frameworks for applications in Electromagnetics and Earth Sciences. ***Future*** interests include developing and extending scalable high-order accurate methods for wave propagation applications. This extension includes integrating uncertainty quantification and propagation into these numerical methods and further algorithmic developments of the numerical solvers themselves.

Refereed Publications

Google Scholar: `https://scholar.google.com/citations?user=_jAktNkAAAAJ&hl=en`

Total citations (per Google Scholar): 3465

h-index (per Google Scholar): 22

2021 J. E. Kozdon, B. A. Erickson, and L. C. Wilcox, "Hybridized summation-by-parts finite difference methods," *Journal of Scientific Computing*, vol. 87, no. 3, p. 85, May 2021. DOI: 10.1007/s10915-021-01448-5.

S. Byrne, L. C. Wilcox, and V. Churavy, "MPI.jl: Julia bindings for the Message Passing Interface," *Proceedings of the JuliaCon Conferences*, vol. 1, no. 1, p. 68, 2021. DOI: 10.21105/jcon.00068.

2019 J. Chan and L. C. Wilcox, "On discretely entropy stable weight-adjusted discontinuous Galerkin methods: Curvilinear meshes," *Journal of Computational Physics*, vol. 378, pp. 366–393, Feb. 2019. DOI: 10.1016/j.jcp.2018.11.010.

D. S. Abdi, L. C. Wilcox, T. Warburton, and F. X. Giraldo, "A GPU accelerated continuous and discontinuous Galerkin non-hydrostatic atmospheric model," *The International Journal of High Performance Computing Applications*, vol. 33, 1 Jan. 2019. DOI: 10.1177/1094342017694427.

N. Koeppen, I. M. Ross, L. C. Wilcox, and R. J. Proulx, "Fast mesh refinement in pseudospectral optimal control," *Journal of Guidance, Control, and Dynamics*, vol. 42, no. 4, pp. 711–722, Apr. 2019. DOI: 10.2514/1.G003904.

D. S. Abdi, F. X. Giraldo, E. M. Constantinescu, L. E. Carr, L. C. Wilcox, and T. C. Warburton, "Acceleration of the IMplicitEXplicit nonhydrostatic unified model of the atmosphere on manycore processors," *The International Journal of High Performance Computing Applications*, vol. 33, no. 2, pp. 242–267, 2019. DOI: 10.1177/1094342017732395.

A. Müller, M. A. Kopera, S. Marras, L. C. Wilcox, T. Isaac, and F. X. Giraldo, "Strong scaling for numerical weather prediction at petascale with the atmospheric model NUMA," *The International Journal of High Performance Computing Applications*, vol. 33, no. 2, pp. 411–426, 2019. DOI: 10.1177/1094342018763966.

J. E. Kozdon, L. C. Wilcox, T. Hagstrom, and J. W. Banks, "Robust approaches to handling complex geometries with Galerkin difference methods," *Journal of Computational Physics*, vol. 392, pp. 483–510, Sep. 2019. DOI: 10.1016/j.jcp.2019.04.031.

2018 J. E. Kozdon and L. C. Wilcox, "An energy stable approach for discretizing hyperbolic equations with nonconforming discontinuous Galerkin methods," *Journal of Scientific Computing*, vol. 76, no. 3, pp. 1742–1784, Sep. 2018. DOI: 10.1007/s10915-018-0682-1.

2017 W. Kang and L. C. Wilcox, "Mitigating the curse of dimensionality: Sparse grid characteristics method for optimal feedback control and HJB equations," *Computational Optimization and Applications*, vol. 68, no. 2, pp. 289–315, Nov. 2017. DOI: 10.1007/s10589-017-9910-0.

W. Kang, O. Yakimenko, and L. Wilcox, "Optimal control of UAVs using the sparse grid characteristic method," in *2017 3rd International Conference on Control, Automation and Robotics (ICCAR)*, (32% acceptance rate), Apr. 2017, pp. 771–776. DOI: 10.1109/ICCAR.2017.7942802.

W. Kang and L. C. Wilcox, "Solving 1D conservation laws using Pontryagin's minimum principle," *Journal of Scientific Computing*, vol. 71, no. 1, pp. 144–165, Apr. 2017. DOI: 10.1007/s10915-016-0294-6.

2016 R. Ye, M. V. de Hoop, C. L. Petrovitch, L. J. Pyrak-Nolte, and L. C. Wilcox, "A discontinuous Galerkin method with a modified penalty flux for the propagation and scattering of acousto-elastic waves," *Geophysical Journal International*, 2016. DOI: 10.1093/gji/ggw070.

A. Klöckner, L. C. Wilcox, and T. Warburton, "Array program transformation with Loo.py by example: High-order finite elements," in *Proceedings of the 3rd ACM SIGPLAN International Workshop on Libraries, Languages, and Compilers for Array Programming*, ser. ARRAY 2016, Santa Barbara, CA, USA: ACM, 2016, pp. 9–16. DOI: 10.1145/2935323.2935325.

J. E. Kozdon and L. C. Wilcox, "Stable coupling of nonconforming, high-order finite difference methods," *SIAM Journal on Scientific Computing*, vol. 38, no. 2, A923–A952, 2016. DOI: 10.1137/15M1022823.

2015 W. Kang and L. C. Wilcox, "An example of solving HJB equations using sparse grid for feedback control," in *54th IEEE Conference on Decision and Control*, (56.6% acceptance rate), 2015. DOI: 10.1109/CDC.2015.7402358.

T. Isaac, C. Burstedde, L. C. Wilcox, and O. Ghattas, "Recursive algorithms for distributed forests of octrees," *SIAM Journal on Scientific Computing*, vol. 37, no. 5, pp. C497–C531, Sep. 2015. DOI: 10.1137/140970963.

L. C. Wilcox, G. Stadler, T. Bui-Thanh, and O. Ghattas, "Discretely exact derivatives for hyperbolic PDE-constrained optimization problems discretized by the discontinuous Galerkin method," English, *Journal of Scientific Computing*, vol. 63, no. 1, pp. 138–162, Apr. 2015. DOI: 10.1007/s10915-014-9890-5.

W. Kang and L. Wilcox, "A causality free computational method for HJB equations with application to rigid body satellites," in *AIAA Guidance, Navigation, and Control Conference*, American Institute of Aeronautics and Astronautics, Feb. 2015. DOI: 10.2514/6.2015-2009.

2013 X. He, E. Lee, L. Wilcox, R. Munipalli, and L. Pilon, "A high-order-accurate GPU-based radiative transfer equation solver for combustion and propulsion applications," *Numerical Heat Transfer, Part B: Fundamentals*, vol. 63, no. 6, pp. 457–484, 2013. DOI: 10.1080/10407790.2013.778669.

C. Burstedde, G. Stadler, L. Alisic, L. C. Wilcox, E. Tan, M. Gurnis, and O. Ghattas, "Large-scale adaptive mantle convection simulation," *Geophysical Journal International*, vol. 192, no. 3, pp. 889–906, 2013. DOI: 10.1093/gji/ggs070.

2012 T. Bui-Thanh, C. Burstedde, O. Ghattas, J. Martin, G. Stadler, and L. C. Wilcox, "Extreme-scale UQ for Bayesian inverse problems governed by PDEs," in *Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis*, ser. SC '12, Los Alamitos, CA, USA: IEEE Computer Society, 2012, 3:1–3:11. DOI: 10.1109/SC.2012.56.

J. Martin, L. C. Wilcox, C. Burstedde, and O. Ghattas, "A stochastic Newton MCMC method for large-scale statistical inverse problems with application to seismic inversion," *SIAM Journal on Scientific Computing*, vol. 34, no. 3, A1460–A1487, 2012. DOI: 10.1137/110845598.

2011 C. Burstedde, L. C. Wilcox, and O. Ghattas, "p4est: Scalable algorithms for parallel adaptive mesh refinement on forests of octrees," *SIAM Journal on Scientific Computing*, vol. 33, no. 3, pp. 1103–1133, 2011. DOI: 10.1137/100791634.

H. P. Flath, L. C. Wilcox, V. Akçelik, J. Hill, B. van Bloemen Waanders, and O. Ghattas, "Fast algorithms for Bayesian uncertainty quantification in large-scale linear inverse problems based on low-rank partial Hessian approximations," *SIAM Journal on Scientific Computing*, vol. 33, no. 1, pp. 407–432, 2011. DOI: 10.1137/090780717.

2010 L. Alisic, M. Gurnis, G. Stadler, C. Burstedde, L. C. Wilcox, and O. Ghattas, "Slab stress and strain rate as constraints on global mantle flow," *Geophysical Research Letters*, vol. 37, p. L22308, 2010. DOI: 10.1029/2010GL045312.

L. C. Wilcox, G. Stadler, C. Burstedde, and O. Ghattas, "A high-order discontinuous Galerkin method for wave propagation through coupled elastic-acoustic media," *Journal of Computational Physics*, vol. 229, pp. 9373–9396, 24 Dec. 2010. DOI: 10.1016/j.jcp.2010.09.008.

G. Stadler, M. Gurnis, C. Burstedde, L. C. Wilcox, L. Alisic, and O. Ghattas, "The Dynamics of Plate Tectonics and Mantle Flow: From Local to Global Scales," *Science*, vol. 329, no. 5995, pp. 1033–1038, 2010. DOI: 10.1126/science.1191223.

C. Burstedde, O. Ghattas, M. Gurnis, T. Isaac, G. Stadler, T. Warburton, and L. Wilcox, "Extreme-scale AMR," in *Proceedings of the 2010 ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, ser. SC '10, Washington, DC, USA: IEEE Computer Society, 2010, pp. 1–12. DOI: 10.1109/SC.2010.25.

J. S. Hesthaven, T. Warburton, C. Chauviere, and L. Wilcox, "High-order discontinuous Galerkin methods for computational electromagnetics and uncertainty quantification," English, in *Scientific Computing in Electrical Engineering SCEE 2008*, ser. Mathematics in Industry, J. Roos and L. R. Costa, Eds., vol. 14, 2010, pp. 403–412. DOI: 10.1007/978-3-642-12294-1_50.

2009 C. Burstedde, M. Burtscher, O. Ghattas, G. Stadler, T. Tu, and L. C. Wilcox, "ALPS: A framework for parallel adaptive PDE solution," in *Journal of Physics: Conference Series*, vol. 180, 2009, p. 012 009. DOI: 10.1088/1742-6596/180/1/012009.

C. Burstedde, O. Ghattas, G. Stadler, T. Tu, and L. C. Wilcox, "Parallel scalable adjoint-based adaptive solution of variable-viscosity Stokes flow problems," *Computer Methods in Applied Mechanics and Engineering*, vol. 198, no. 21–26, pp. 1691–1700, 2009, Advances in Simulation-Based Engineering Sciences - Honoring J. Tinsley Oden. DOI: 10.1016/j.cma.2008.12.015.

2008 C. Burstedde, O. Ghattas, M. Gurnis, G. Stadler, E. Tan, T. Tu, L. C. Wilcox, and S. Zhong, "Scalable adaptive mantle convection simulation on petascale supercomputers," in *SC '08: Proceedings of the 2008 ACM/IEEE conference on Supercomputing*, Piscataway, NJ, USA, 2008, pp. 1–15. DOI: 10.1109/SC.2008.5214248.

C. Burstedde, O. Ghattas, G. Stadler, T. Tu, and L. C. Wilcox, "Towards adaptive mesh PDE simulations on petascale computers," in *TeraGrid'08*, Las Vegas, NV, 2008.

2007 C. Chauviere, J. S. Hesthaven, and L. C. Wilcox, "Efficient computation of RCS from scatterers of uncertain shapes," *IEEE Transactions on Antennas and Propagation*, vol. 55, no. 5, pp. 1437–1448, May 2007. DOI: 10.1109/TAP.2007.895629.

L. N. Olson, J. S. Hesthaven, and L. C. Wilcox, "Developments in overlapping Schwarz preconditioning of high-order nodal discontinuous Galerkin discretizations," in *Domain decomposition methods in science and engineering XVI*, ser. Lecture Notes in Computational Science and Engineering, vol. 55, Berlin: Springer, 2007, pp. 325–332. DOI: 10.1007/978-3-540-34469-8_39.

2005 R. Horvath, L. C. Wilcox, H. C. Pedersen, N. Skivesen, J. S. Hesthaven, and P. M. Johansen, "Analytical and numerical study on grating depth effects in grating coupled waveguide sensors," *Applied Physics B: Lasers and Optics*, vol. 81, pp. 65–73, 2005. DOI: 10.1007/s00340-005-1841-2.

2004 L. C. Wilcox, P. G. Dinesen, and J. S. Hesthaven, "Fast and accurate boundary variation method for multilayered diffraction optics," *Journal of the Optical Society of America A*, vol. 21, no. 5, pp. 757–769, May 2004. DOI: 10.1364/JOSAA.21.000757.

2002 T. Camp, J. Boleng, and L. Wilcox, "Location information services in mobile ad hoc networks," in *Proceedings of the IEEE International Conference on Communications (ICC 2002)*, (40.8% acceptance rate), New York City, NY, 2002, pp. 3318–3324.

T. Camp, J. Boleng, B. Williams, L. Wilcox, and W. Navidi, "Performance evaluation of two location based routing protocols," in *Proceedings of the IEEE 21st Annual Joint Conference of the IEEE Computer and Communications Societies (INFOCOM 2002)*, (20.5% acceptance rate), New York City, NY, 2002, pp. 1678–1687.

2001 J. Boleng, B. Williams, T. Camp, L. Wilcox, and W. Navidi, "Performance of location-based routing protocols for an ad hoc network," in *Proceedings of the 11th Local and Metropolitan Area Networks Workshop (LANMAN 2001)*, Boulder, CO, Mar. 2001, pp. 98–101.

Non-refereed Publications

2009 O. Ghattas, J. Martin, L. Wilcox, and C. Burstedde, "A stochastic Newton method for Bayesian inverse problems," in *Numerical Techniques for Optimization Problems with PDE Constraints*, M. Heinkenschloss, R. H. W. Hoppe, and V. Schulz, Eds., ser. Oberwolfach Report, Mathematisches Forschungsinstitut Oberwolfach, vol. 04/2009, 2009, pp. 215–218. DOI: 10.4171/OWR/2009/04.

2008 T. Warburton, T. Hagstrom, and L. C. Wilcox, "Accelerating the discontinuous Galerkin time-domain method," in *Nonstandard Finite Element Methods*, S. C. Brenner, C. Carstensen, and P. Monk, Eds., ser. Oberwolfach Report, Mathematisches Forschungsinstitut Oberwolfach, vol. 36/2008, 2008, pp. 2084–2086.

G. Stadler, C. Burstedde, O. Ghattas, T. Tu, and L. C. Wilcox, "Towards highly parallel mesh adaptation for large-scale PDE applications," in *Optimal Control of Coupled Systems of PDE*, K. Kunisch, G. Leugering, J. Sprekels, and F. Tröltzsch, Eds., ser. Oberwolfach Report, Mathematisches Forschungsinstitut Oberwolfach, vol. 13/2008, 2008, pp. 645–655.

2007 C. Chauviere, J. S. Hesthaven, L. Lurati, and L. C. Wilcox, "DG-FEM for CEM with uncertainty," in *Proceedings of 23rd International Review of Progress in Applied Computational Electromagnetics*, Verona, Italy, Mar. 2007. [Online]. Available: http://www.aces-society.org/search.php?year=2222.

2004 B. G. van Bloemen Waanders, R. A. Bartlett, S. S. Collis, E. R. Keiter, C. C. Ober, T. M. Smith, V. Akçelik, O. Ghattas, J. C. Hill, M. Berggren, M. Heinkenschloss, and L. C. Wilcox, "Sensitivity technologies for large scale simulation," Sandia National Laboratory, PO Box 5800, Albuquerque, NM 87185-5800, Technical Report SAND2004-6574, 2004.

Ph.D. Thesis

2006 L. C. Wilcox, "High-order accurate methods for solving the time-harmonic Maxwell's equations," Ph.D. in Applied Mathematics, Brown University, 182 George Street, Providence, RI 02912, 2006.

Presentations

2020 *p4est and occa*, p4est Summer School, JULY 2020, sponsored by the Hausdorff Center for Mathematics at the University of Bonn, Germany.

2019 *Performant parallelism with productivity and portability*, Birds of a Feather speaker, JULY 2019, juliacon, University of Maryland, Baltimore SMC Campus Center, Baltimore, Maryland.

The pursuit of stable high-order accurate numerical wave propagation, Math Department Colloquium, FEB 2019, Virginia Tech, Blacksburg, Virginia.

2018 *Key Points and Practices to Adopt* and *Pro Julia*, Data-Driven Earth System Modeling Kickoff (aka Climate Modeling Alliance Kickoff), SEP 2018, Caltech, Pasadena, California.

2015 *Stable Projection Operators For High-Order Finite Difference Methods*, SIAM Conference on Mathematical and Computational Issues in the Geosciences, JUL 2015, Stanford, California.

2014 *NPS-NRL-Rice-UIUC Collaboration on Navy Atmosphere-Ocean Coupled Models on Many-Core Computer Architectures: Overview and Progress*, Advanced Air-Ocean-Land-Ice Global Coupled Prediction on Emerging Computational Architectures Meeting NOV 2014, Boulder, Colorado.

High-Performance High-Order Accurate Geophysical Modeling, International Conference on Spectral and High Order Methods (ICOSAHOM 2014), JUN 2014, Salt Lake City, Utah.

Stable Projection Operators For High-Order Finite Difference Methods International Conference on Theoretical and Computational Acoustics (ICTCA 2014), MAR 2014, College Station, Texas.

2013 *beard: Towards an Adaptive and High-Order Accurate Numerical Method for Earthquake Rupture Dynamics in Complex Geometries* Poster, 2013 American Geophysical Union Fall Meeting, DEC 2013, San Francisco, California.

NPS-NRL-Rice-UIUC Collaboration on Navy Atmosphere-Ocean Coupled Models on Many-Core Computer Architectures: Overview and Introduction to Loo.py, Advanced Air-Ocean-Land-Ice Global Coupled Prediction on Emerging Computational Architectures Kick-Off Meeting NOV 2013, Tallahassee, Florida.

2012 *High-Order Accurate Solution of Acoustic-Elastic Interface Problems on Adapted Meshes Using a Discontinuous Galerkin Method*, Fluids & Combustion Seminar, San Diego State University, MAY 2012, San Diego, California.

High-Order Accurate Solution of Acoustic-Elastic Interface Problems on Adapted Meshes Using a Discontinuous Galerkin Method, The Geo Mathematical Imaging Group, Purdue University, MAR 2012, West Lafayette, Indiana.

High-Order Accurate Solution of Acoustic-Elastic Interface Problems on Adapted Meshes Using a Discontinuous Galerkin Method, Department of Applied Math Seminar, Naval Postgraduate School, JAN 2012, Monterey, California.

2011 *High-Order Accurate Solution of Acoustic-Elastic Interface Problems on Adapted Meshes Using a Discontinuous Galerkin Method*, Computer Science Research Institute Seminar, Sandia, AUG 2011, Albuquerque, New Mexico.

2010 *High-Order Accurate Solution of Coupled Acoustic-Elastic Wave Propagation Problems on Adapted Meshes using a Discontinuous Galerkin Method on Massively Parallel Computers*, 14th SIAM Conference on Parallel Processing for Scientific Computing, FEB 2010, Seattle, Washington.

2009 *High-Order Accurate Solution of Acoustic-Elastic Interface Problems on Adapted Meshes Using a Discontinuous Galerkin Method*, Poster, 2009 American Geophysical Union Fall Meeting, DEC 2009, San Francisco, California.

A Discontinuous Galerkin Method for Wave Propagation in Coupled Acoustic-Elastic Media, Poster, International Conference on Advances in Scientific Computing, Brown University, DEC 2009, Providence, Rhode Island.

Towards Deterministic and Statistical Full Waveform Inversion, Dix Seismo Lab Seminar, Seismological Laboratory, California Institute of Technology, DEC 2009, Pasadena, California.

Towards Deterministic and Statistical Full Waveform Inversion, Mechanical Engineering Seminar Series, Department of Mechanical Engineering, The University of Texas at San Antonio, NOV 2009, San Antonio, Texas.

ALPS: A framework for parallel adaptive PDE solution, Poster, SC09, NOV 2009, Portland, Oregon.

Path to Fully-Implicit Parallel Adaptive Solution of Mantle Convection Problems, SIAM Annual Meeting, JUL 2009, Denver, Colorado.

mangll: A Scalable Adaptive High-Order Discretization Library, Poster, SIAM Conference on Computational Science and Engineering, MAR 2009, Miami, Florida.

2008 *Scalable Adaptive Mantle Convection Simulation on Petascale Supercomputers*, Colloquia, Department of Mathematics, Southern Methodist University, DEC 2008, Dallas, Texas.

Parallel Adaptive Mantle Convection Simulation, Poster, Center for Subsurface Modeling Affiliates Meeting, OCT 2008, Austin, Texas.

Parallel Adaptive Mantle Convection Simulation, Poster, CIG Workshop on Mathematical and Computational Issues in the Solid Earth Geosciences, SEP 2008, Santa Fe, New Mexico.

Parallel Adaptive Solution of Mantle Convection Problems, SIAM Annual Meeting, JUL 2008, San Diego, California.

Towards Adaptive Petascale Simulations of Geophysical Phenomena, Scientific Computing Seminar, Division of Applied Mathematics, Brown University, MAY 2008, Providence, Rhode Island.

Towards Petascale Simulations of Geophysical Phenomena, Colloquia, Department of Mathematics and Statistics, The University of New Mexico, FEB 2008, Albuquerque, New Mexico.

2007 *Occam meets Bayes: Bridging the Divide*, Poster, SIAM Conference on Computational Science and Engineering, FEB 2007, Costa Mesa, California.

2006 *hp-Adaptive Solutions of the Time-Harmonic Maxwell's Equations Using a Nodal Discontinuous Galerkin Method*, Institute for Computational Engineering and Sciences Seminar, University of Texas at Austin, OCT 2006, Austin, Texas.

Sledge++ — A Discontinuous Galerkin Finite Element Discretization Package, 7th World Congress on Computational Mechanics, JUL 2006, Los Angeles, California.

2005 *Implementation and examples using Sledge++ (a high-order nodal discontinuous Galerkin library)*, CAAM Graduate Seminar, Computational and Applied Mathematics, Rice University, NOV 2005, Houston, Texas.

Adjoint Based A Posteriori Error Analysis for a 3D High-Order Nodal Discontinuous Galerkin Method, Student Internship Symposium, AUG 2005, Albuquerque, New Mexico.

2004 *Adjoint Based A Posteriori Error Analysis Applied to a High-Order Nodal Discontinuous Galerkin Method*, Student Internship Symposium, AUG 2004, Albuquerque, New Mexico.

Scholarships and Fellowships

2006 *ICES Postdoctoral Fellowship*, 2006-09-01–2008-08-31.

2004 *CSRI Summer Student Fellowship*, 2004-05-28–2004-09-01.

2001 *NSF VIGRE Fellowship*, 2001-09-01–2004-05-27.

1999 *Bartunek Scholarship-Math*, 1999-08-24–2001-05-04. *Jack Cohen Memorial Scholarship*, 1999-08-24–2000-05-05. *Shell/Math Computer Scholarship*, 1999-08-24–2000-05-05.

1997 *CSM Presidential Scholarship*, 1997-08-23–2001-05-13.

Grants

2019 Francis X. GIRALDO, principal investigator, Jeremy E. KOZDON, co-principal investigator, Lucas C. WILCOX, co-principal investigator, *Next Generation Earth Systems Model*, CRADA with Caltech, $425,169.

2018 Francis X. GIRALDO, principal investigator, Jeremy E. KOZDON, co-principal investigator, Lucas C. WILCOX, co-principal investigator, *Next Generation Earth Systems Model*, CRADA with Caltech, $440,576.

2015 Wei KANG, principal investigator, Lucas C. WILCOX, co-principal investigator, *Mitigating the Curse of Dimensionality Using Sparse Grids for the Optimal Maneuvering of Autonomous Vehicles*, DARPA, $55,239.

2014 Wei KANG, principal investigator, Lucas C. WILCOX, co-principal investigator, *Computational Solutions for Real-time Optimal Maneuvering of Unmanned Vehicles*, NPS CRUSER, $59,864.

2013 Lucas C. WILCOX and Francis X. GIRALDO, principal investigators, Timothy CAMPBELL, Andreas KLÖCKNER, Timothy WARBURTON, and Timothy WHITCOMB co-principal investigators, *NPS-NRL-*

Rice-UIUC Collaboration on Navy Atmosphere-Ocean Coupled Models on Many-Core Computer Architectures, N0001413WX21477, 2013-10-01–2016-09-30, $1,023,366.

Wei KANG and Lucas C. WILCOX, principal investigators, *Solving High Dimensional HJB Equations Using Parallel Computing*, AFOSR, 2013-10-01–2015-09-30, $100,000.

2011 Lucas C. WILCOX, principal investigator, Thomas HAGSTROM co-principal investigator, *STTR Topic # A11a-T015: A Priori Error-Controlled Simulations of Electromagnetic Phenomena for HPC*, W911NF-11-C-0244, 2011-08-31–2012-02-27, $99,996.

2010 Omar GHATTAS, principal investigator, Stephen P. GRAND, Carsten BURSTEDDE, Georg STADLER, and Lucas C. WILCOX, co-principal investigators, *CDI Type II: Collaborative Research: Ultra-high resolution dynamic earth models through joint inversion of seismic and geodynamic data*, 1028889, 2010-09-01–2014-08-31, $949,919.

2009 Omar GHATTAS, principal investigator, Donald D. BLANKENSHIP, Carsten BURSTEDDE, Charles S. JACKSON, Georg STADLER, and Lucas C. WILCOX, co-principal investigators, *Computational Science Research for Ice Sheet Modeling*, DE-SC0002710, 2009-09-01–2012-08-31, $981,327.

Omar GHATTAS, principal investigator, Leszek DEMKOWICZ, J. Tinsley ODEN, and Lucas C. WILCOX, co-principal investigators, *Uncertainty Quantification for Large-Scale Inverse Scattering*, FA9550-09-1-0608, 2009-08-01–2012-07-31, $900,000.

2008 Omar GHATTAS, principal investigator, Carsten BURSTEDDE, Georg STADLER, and Lucas C. WILCOX, co-principal investigators, *an NSF LRAC allocation supporting our scalable adaptive Mantle convection research*, TG-MCA04N026, 2008-10-01–2009-09-30, 15,000,000 SUs.

Awards and Honors

2016 Carl E. and Jesse W. Menneken Annual Faculty Award for Excellence in Scientific Research.

Ranked in the top 5% for Rear Admiral John Jay Schieffelin Award for Teaching Excellence for the 2015 Academic Year.

2012 *Finalist, 2012 ACM Gordon Bell Prize* for the entry T. Bui-Thanh, C. Burstedde, O. Ghattas, J. Martin, G. Stadler, and L. C. Wilcox, "Extreme-scale UQ for Bayesian inverse problems governed by PDEs," in *Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis*, ser. SC '12, Los Alamitos, CA, USA: IEEE Computer Society, 2012, 3:1–3:11. DOI: 10.1109/SC.2012.56.

Best Visualization Award at XSEDE12 Conference, Chicago, July 1619, 2012, for animation of global seismic wave propagation (with Greg Abram, Carsten Burstedde, Georg Stadler, and Lucas Wilcox).

2010 *Finalist, 2010 ACM Gordon Bell Prize* for the entry C. Burstedde, O. Ghattas, M. Gurnis, T. Isaac, G. Stadler, T. Warburton, and L. Wilcox, "Extreme-scale AMR," in *Proceedings of the 2010 ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, ser. SC '10, Washington, DC, USA: IEEE Computer Society, 2010, pp. 1–12. DOI: 10.1109/SC.2010.25.

Research on multiresolution supercomputing models of mantle flow and plate tectonics was featured on the cover of August 27, 2010 issue of Science. The corresponding article is G. Stadler, M. Gurnis, C. Burstedde, L. C. Wilcox, L. Alisic, and O. Ghattas, "The Dynamics of Plate Tectonics and Mantle Flow: From Local to Global Scales," *Science*, vol. 329, no. 5995, pp. 1033–1038, 2010. DOI: 10.1126/science.1191223.

2009 *Best Poster, Supercomputing 09* for the poster ALPS: A Framework for Parallel Adaptive PDE Solution, Carsten Burstedde, Omar Ghattas, Tiankai Tu, Georg Stadler, and Lucas Wilcox, SC09, Portland, OR, November 2009.

2008 *Finalist, 2008 ACM Gordon Bell Prize* for the entry C. Burstedde, O. Ghattas, M. Gurnis, G. Stadler, E. Tan, T. Tu, L. C. Wilcox, and S. Zhong, "Scalable adaptive mantle convection simulation on petascale supercomputers," in *SC '08: Proceedings of the 2008 ACM/IEEE conference on Supercomputing*, Piscataway, NJ, USA, 2008, pp. 1–15. DOI: 10.1109/SC.2008.5214248.

TeraGrid Capability Computing Challenge Award for the entry C. Burstedde, O. Ghattas, G. Stadler, T. Tu, and L. C. Wilcox, "Towards adaptive mesh PDE simulations on petascale computers," in *TeraGrid'08*, Las Vegas, NV, 2008.

Service

Committees and Panels

2020 NPS Department of Applied Mathematics *Associate Chair for Research* JAN 2020–PRESENT.

2018 NPS Department of Applied Mathematics *Faculty Council Alternate* JAN 2018–DEC 2020.

NPS Department of Applied Mathematics Faculty Search Committee.

2013 NPS Department of Applied Mathematics Faculty Chair Selection Committee.

NPS HPC Advisory Panel JUN 2013–PRESENT.

Meetings Organized

2020 *Organizer* with Carsten Burstedde and Tobin Isaac for the `p4est` Summer School sponsored by the Hausdorff Center for Mathematics at the University of Bonn, Germany.

2019 *Local organizing committee* for the North American High Order Methods Conference (NAHOMCon19).

2014 *High-Performance High-Order Simulation Tools and Techniques* mini-symposium for the International Conference on Spectral and High Order Methods (ICOSAHOM 2014).

2010 *Challenges in Parallel Adaptive Mesh Refinement* mini-symposium for the SIAM Conference on Parallel Processing and Scientific Computing (PP10).

Editorial and Reviews

Computers & Mathematics with Applications Editorial Board JUN 2015–PRESENT.

Referee/Reviewer for: ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming, ACM Transactions on Mathematical Software, Applied Numerical Mathematics, Communications in Computational Physics, Computer Methods in Applied Mechanics and Engineering, Department of Energy, Geophysical Prospecting, HiPC 2015, ICOSAHOM 2014, IEEE International Parallel and Distributed Processing Symposium (IPDPS), InPar 2012, Journal of Computational and Applied Mathematics, Journal of Computational Physics, Journal of Scientific Computing, Parallel Computing, PPoPP 2014, SC07, SIAM, SIAM Journal on Numerical Analysis, SIAM Journal on Scientific Computing, Springer, Swiss National Science Foundation, TeraGrid'08, and U. S. Army Research Office.

TEACHING

Courses

AY2022 Instructor, FALL, *ma3132: Partial Differential Equations and Integral Transforms*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, FALL, *ma2121: Differential Equations*, Department of Applied Mathematics, Naval Postgraduate School.

AY2021 Instructor, SUMMER, *ma3132: Partial Differential Equations and Integral Transforms (two segments)*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, SUMMER, *ma3232: Numerical Analysis*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, FALL, *ma2121: Differential Equations (two segments)*, Department of Applied Mathematics, Naval Postgraduate School.

AY2020 Instructor, SUMMER, *ma3132: Partial Differential Equations and Integral Transforms (two segments)*, Department of Applied Mathematics, Naval Postgraduate School.

AY2019 Instructor, SPRING, *ma2121: Differential Equations*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, FALL, *ma2043: Introduction to Matrix and Linear Algebra*, Department of Applied Mathematics, Naval Postgraduate School.

AY2018 Instructor, WINTER, *ma1114: Single Variable Calculus II with Matrix Algebra*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, WINTER, *ma1113: Single Variable Calculus I*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, FALL, *ma2121: Differential Equations (two segments)*, Department of Applied Mathematics, Naval Postgraduate School.

AY2017 Instructor, SPRING, *ma1114: Single Variable Calculus II with Matrix Algebra*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, SPRING, *ma1113: Single Variable Calculus I*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, WINTER, *ma2121: Differential Equations*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, WINTER, *ma4248 Numerical Linear Algebra*, Department of Applied Mathematics, Naval Postgraduate School.

AY2016 Instructor, SUMMER, *ma2121: Differential Equations (two segments)*, Department of Applied Mathematics, Naval Postgraduate School.

AY2015 Instructor, SPRING, *ma4261: Parallel Programming*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, FALL, *ma2121: Differential Equations (two segments)*, Department of Applied Mathematics, Naval Postgraduate School.

AY2014 Instructor, SPRING, *ma2121: Differential Equations*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, SPRING, *ma4261: Parallel Programming*, Department of Applied Mathematics, Naval Postgraduate School.

AY2013 Instructor, SUMMER, *ma3232: Numerical Analysis*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, SUMMER, *ma2121: Differential Equations*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, FALL, *ma1114: Single Variable Calculus II with Matrix Algebra*, Department of Applied Mathematics, Naval Postgraduate School.

Instructor, FALL, *ma1113: Single Variable Calculus I*, Department of Applied Mathematics, Naval Postgraduate School.

2006 Co-instructor, SPRING, *Introduction to Computing Sciences*, Division of Applied Mathematics, Brown University.

2005 Recitation Leader, SPRING 2005, *Introduction to Computing Sciences*, Division of Applied Mathematics, Brown University.

Students Advised

2018 Co-adviser with I. Michael ROSS to Nick KOEPPEN M.S. Student, 2017-04-01–2018-06-15.

2014 Co-adviser with Jeremy KOZDON to Matthew FLETCHER M.S. Student, 2014-07-01–2015-06-19.

Co-adviser with Jeremy KOZDON to Benjamin DAVIS M.S. Student, 2014-07-01–2015-06-19.

2007 Co-adviser with Omar GHATTAS to James MARTIN, Ph.D. Student, 2007-09-01–2010-05-31.

2006 Co-adviser with Omar GHATTAS to Jennifer WORTHEN, Ph.D. Student, 2006-09-01–2010-05-31.

Co-adviser with Omar GHATTAS to H. Pearl FLATH, Ph.D. Student, 2006-09-01–2010-05-31.

EXHIBITIONS

2008 *PROSPECT: Art that Renegotiates Standardized Locations in our Environment*, Creative Research Laboratory, Austin, Texas, 2008-11-22–2008-12-13.

CODES

2018 Co-developer of `ClimateMachine.jl` (`https://github.com/CliMA/ClimateMachine.jl`), an earth systems model. 2018-12-17–PRESENT.

2013 Co-developer of `beard`, a dynamic rupture application. 2013-01-11–PRESENT.

Co-developer of `bfam` (`http://bfam.in/`), a set of tools to develop coupled discontinuous Galerkin and multi-block summation-by-parts methods to solve multi-physics problems, 2013-01-11–2016-10-01.

2012 Co-developer of `MPI.jl` (`https://github.com/JuliaParallel/MPI.jl`), MPI wrappers for Julia, 2012-07-28–PRESENT.

2010 Lead developer of `HDphysics`, a commercial MPI and OpenCL based library for solving time-dependent hyperbolic partial differential equations using discontinuous Galerkin methods on CPU and GPU clusters (a Maxwell's equation solver for radar cross-section calculations based on `HDphysics` been installed at the Missile Defense Agency (MDA-Huntsville), NAVAIR, AFRL-Wright Patterson AFB, and Eglin AFB), 2010-07-10–2012-09-23.

2008 Lead developer of `mangll`, an MPI based framework for large-scale high-order *h*-adaptive finite element discretizations with applications in geosciences, 2008-05-27–2010-06-01.

2007 Co-developer of `p4est` (`http://p4est.org/`), a C library to manage a collection (a forest) of multiple connected adaptive quadtrees or octrees in parallel, 2007-11-23–PRESENT.

Lead developer of `pFudg`, an MPI based library for solving time-dependent hyperbolic partial differential equations using quadrature based discontinuous Galerkin methods, 2007-05-11–2010-06-01.

2004 Co-developer of `Sledge++`, an object oriented C++ library for conforming and nonconforming *hp*-adaptive discontinuous Galerkin methods, 2004-12-15–2007-12-05.