

Chris Ketelsen

Teacher / Computational Scientist

Boulder, CO
(303) 735 5289
ketelsen@colorado.edu
cs.colorado.edu/~ketelsen

Education

- 2005–2009 **PhD**, *University of Colorado at Boulder*, Boulder, CO.
PhD in Applied Mathematics
Dissertation: *Least-Squares Finite Elements for Quantum Electrodynamics*
Advisors: Tom Manteuffel and Steve McCormack
- 2003–2005 **MS**, *Washington State University*, Pullman, WA.
MS in Applied Mathematics
- 1999–2003 **BA/BS**, *Washington State University*, Pullman, WA.
BA in Philosophy, with honors
BS in Mathematics, with honors

Professional Experience

- 2016–present **Instructor**, *University of Colorado at Boulder*, Department of Computer Science, Boulder, CO.
- 2013–2016 **Instructor**, *University of Colorado at Boulder*, Department of Applied Mathematics, Boulder, CO.
- 2013–2016 **Summer Research Associate**, *University of Colorado at Boulder*, Department of Applied Mathematics, Boulder, CO.
- 2011–2013 **Postdoctoral Research Associate**, *Lawrence Livermore National Laboratory*, Center for Applied Scientific Computing, Livermore, CA.
- 2009–2010 **Instructor / Postdoctoral Research Associate**, *University of Colorado at Boulder*, Department of Applied Mathematics, Boulder, CO.
- 2007–2009 **Graduate Research Assistant**, *University of Colorado at Boulder*, Department of Applied Mathematics, Boulder, CO.
- 2006–2008 **Summer Research Assistant**, *Los Alamos National Laboratory*, Mathematical Modeling and Analysis Group, Los Alamos, NM.
- 2005 **Adjunct Instructor**, *Washington State University*, Department of Philosophy, Pullman, WA.
- 2004–2005 **Graduate Research Assistant**, *Washington State University*, Department of Mathematics, Pullman, WA.
- 2003–2004 **Graduate Teaching Assistant**, *Washington State University*, Department of Mathematics, Pullman, WA.
- 2002–2003 **Undergraduate Research Assistant**, *Washington State University*, Department of Mathematics, Pullman, WA.

Research Interests

Uncertainty Quantification
Multilevel Monte Carlo Methods
Multilevel Iterative Solution of Large Sparse Linear Systems
Numerical Solution of Partial Differential Equations

Teaching Experience

Instructor for CSCI 5646	Numerical Linear Algebra	CU Boulder
Instructor for CSCI 5622	Machine Learning	CU Boulder
Instructor for CSCI 3022	Introduction to Data Science	CU Boulder
Instructor for CSCI 2824	Discrete Structures	CU Boulder
Instructor for CSCI 2820	Linear Algebra with CS Apps.	CU Boulder
Instructor for APPM 6640	Multigrid Methods	CU Boulder
Instructor for APPM 5720	Computational Linear Algebra	CU Boulder
Instructor for APPM 4660	Undergraduate Numerics II	CU Boulder
Instructor for APPM 4650	Undergraduate Numerics I	CU Boulder
Instructor for APPM 3310	Matrix Methods	CU Boulder
Instructor for APPM 2350	Calculus III	CU Boulder
Instructor for APPM 1350	Calculus I	CU Boulder
Instructor for PHIL 401	Advanced Logic	WSU
Instructor for PHIL 201	Elementary Logic	WSU
Instructor for MATH 202	Business Calculus	WSU
Instructor for MATH 103	College Algebra	WSU

Course Development

Developed CSCI 3022	Introduction to Data Science	CU Boulder
Developed APPM 5720	Computational Linear Algebra	CU Boulder

Research Advising

Chair or Co-Chair

2010 **Anna Lieb**, BS in Applied Math.

Committee Member

2018 **James Folberth**, PhD in Applied Math, expected.

2018 **Nathan Heavner**, PhD in Applied Math, expected.

2017 **Hillary Fairbanks**, PhD in Applied Math, expected.

2017 **Aly Fox**, PhD in Applied Math.

2017 **Karthik Kannan**, MS in Computer Science.

2017 **Nicole Woytarowicz**, BS in Computer Science.

2016 **Ben Sturdevant**, PhD in Applied Math.

2015 **Cristian Mendoza**, MS in Applied Math.

Professional Service

2017 **Instructor Search Committee**, Dept. of Computer Science.

2016-present **Undergraduate Curriculum Committee**, Dept. of Computer Science.

2015-2016 **Undergraduate Independent Study**, Advised three applied math/computer science undergraduates interested in data science and machine learning and two applied math/computer science undergraduates interested in multigrid methods.

2014-2016 **Course Coordinator**, Coordinated large multi-section courses in Calculus III and Matrix Methods. Designing course content and managing instructors, graduate teaching assistants, and undergraduate learning assistants.

2014-2016 **Numerics Help Session**, Founded and staffed twice-weekly help session available to students enrolled in applied math undergraduate and graduate numerics courses.

2007–2008 **Organizer**, SIAM Front Range Applied Mathematics Student Conference.

2007–2008 **President**, University of Colorado at Boulder SIAM Graduate Chapter.

Referee Work.

- SIAM Journal on Scientific Computing
- Numerical Linear Algebra with Applications

Research Funding

2013 DOE, *Adaptive Window-Based Algebraic Multigrid Methods for Flow in Highly Heterogeneous Porous Media*. Sole PI. \$23,717.

Publications

H. Fairbanks, A. Doostan, C. Ketelsen, G. Iaccarino **A Low-Rank Control Variate for Multilevel Monte Carlo Simulation of High-Dimensional Uncertain Systems**, *J. Comp. Phys.*, 341 (2017), pp. 121-139.

C. Ketelsen, T. Manteuffel, J. Schroder, **Least-Squares Finite-Element Solution of the Neutron Transport Equation in Spherical Geometry**, *SIAM J. Sci. Comput.*, 37 (2015), pp. S71-S89.

T. Dodwell, C. Ketelsen, R. Scheichl, A. Teckentrup, **A Hierarchical Multi-level Markov Chain Monte Carlo Algorithm with Applications to Uncertainty Quantification in Subsurface Flow**, *SIAM J. UQ.*, Vol. 3, No. 1 (2015), pp. 1075-1108.

D. Kalchev, C. Ketelsen, P. Vassilevski, **Two-Level Adaptive Algebraic Multigrid for a Sequence of Problems with Slowly Varying Random Coefficients.**, *SIAM J. Sci. Comput.*, 35 (2013), pp. 1215-1234.

M. Brezina, C. Ketelsen, T. Manteuffel, S. McCormick, M. Park, J. Ruge. **Relaxation-Corrected Bootstrap Algebraic Multigrid (rBAMG)**, *J. Num. Lin. Alg. Appl.*, 19 (2012), pp. 178-193.

C. Ketelsen, T. Manteuffel, S. McCormick. **Finite-Element Methods for Quantum Electrodynamics Using a Helmholtz Decomposition of the Gauge Field.**, *J. Num. Lin. Alg. Appl.*, 17 (2010), pp. 539-556.

J. Brannick, C. Ketelsen, T. Manteuffel, S. McCormick. **Least-Squares Finite Element Methods for Quantum Electrodynamics.**, *SIAM J. Sci. Comput.*, 32 (2010), pp. 398-417.

C. Ketelsen, **Least-Squares Finite-Element Methods for Quantum Electrodynamics.**, ProQuest LLC, Ann Arbor, MI, (2009). Thesis (PhD), University of Colorado at Boulder

K. Yewchuck, C. Ketelsen, A. Limon, Y. Mileyko, J. Hoffman, M. Kouritzin. **Tracking and Identifying of Multiple Targets.**, *Canadian Appl. Math Quart.*, 12 (2004), pp. 103-124.

Invited Talks

- 2015 **Julia: Do I Really Have to Learn Another Programming Language?**, SIAM Talk, Univ. of Colorado at Boulder, Dept. of Applied Mathematics, Boulder, CO.
- 2015 **An Introduction to Multilevel Monte Carlo**, Computational Mathematics Seminar, Univ. of Colorado at Boulder, Dept. of Applied Mathematics, Boulder, CO.
- 2014 **Multilevel Markov Chain Monte Carlo Methods for Uncertainty Quantification in Subsurface Flow**, Applied Mathematics Colloquium, Univ. of Colorado at Boulder, Dept. of Applied Mathematics, Boulder, CO.
- 2011 **Adaptive AMG for Diffusion Equations with Stochastic Coefficients**, Special Semester on Multiscale Simulation & Analysis in Energy and the Environment, Radon Institute for Computational and Applied Mathematics, Linz, Austria.
- 2010 **A Least-Squares Finite-Element Discretization of the Schwinger Model**, Computational Mathematics Seminar, University of Colorado at Boulder, Dept. of Applied Mathematics, Boulder, CO.
- 2009 **Adaptive Smoothed Aggregation Multigrid for the 2D Schwinger Model of Quantum Electrodynamics**, 2009 SIAM Annual Meeting, Minisymposium on Adaptive Algebraic Multigrid Methods, Denver, CO.
- 2008 **Least-Squares Finite-Element Methods for Quantum Chromodynamics**, CNLS Seminar, Los Alamos National Laboratory, Center for Nonlinear Studies, Los Alamos, NM.

Selected Contributed Talks

- 2014 **A Least-Squares Finite-Element Discretization of the Neutron Transport Equation in Spherical Geometry**, Thirteenth Copper Mountain Conference on Iterative Methods, Frisco, CO.
- 2013 **Multilevel Markov Chain Monte Carlo for Uncertainty Quantification in Subsurface Flow**, Sixteenth Copper Mountain Conference on Multigrid Methods, Frisco, CO.
- 2012 **An Element-Free Adaptive Algebraic Multigrid Method for Markov Chain Monte Carlo Simulations**, Twelfth Copper Mountain Conference on Iterative Methods, Frisco, CO.
- 2011 **Adaptive AMG for Diffusion Equations with Stochastic Coefficients**, 2011 DOE Applied Mathematics Program Meeting, Washington, DC.
- 2010 **A Gauge Invariant Discretization of Quantum Electrodynamics by Least-Squares Finite Elements**, Eleventh Copper Mountain Conference on Iterative Methods, Frisco, CO.
- 2009 **Multigrid Solvers for Quantum Electrodynamics**, Fourteenth Copper Mountain Conference on Multigrid Methods, Frisco, CO.
- 2008 **A Least-Squares Approach to Disordered Physical Systems**, Tenth Copper Mountain Conference on Iterative Methods, Frisco, CO.
- 2008 **Numerical Challenges in Lattice Quantum Chromodynamics**, 2008 SIAM Front Range Applied Mathematics Student Conference, Denver, CO.

Honors and Awards

- 2011 **Poster Competition Winner**, Workshop on Numerical Analysis of Multiscale Problems & Stochastic Modeling, Radon Institute for Computational and Applied Mathematics, Linz, Austria.
- 2005-2006 **University of Colorado Graduate Fellowship**, University of Colorado at Boulder, Boulder, CO.
- 2004 **Outstanding Graduating Senior in Philosophy**, Washington State University, Pullman, WA.
- 2003-2004 **Phillip H. and Neva Martin Abelson Graduate Fellowship**, Washington State University, Pullman, WA.
- 2003 **Kneebelman Outstanding Senior Award in Mathematics**, Washington State University, Pullman, WA.
- 2003 **College of Sciences Outstanding Undergraduate Research Scholar**, Washington State University, Pullman, WA.