

Curriculum Vitae for Cory D. Hauck

CURRENT EMPLOYMENT

Position: Group Leader, Multiscale Methods
Institution: Oak Ridge National Laboratory (ORNL)
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EDUCATION

- Ph.D., Applied Mathematics, University of Maryland, 2006
Thesis: *Entropy-based moment closures in semiconductor models*
Advisor: C. David Levermore
- M.S., Electrical Engineering, University of Maryland, 2004
- B.S., Physics and Mathematics, University of South Carolina, 1997

RESEARCH INTERESTS

- Numerical Analysis, Computational Physics, and Scientific Computing
- Numerical Methods for Kinetic Equations and Hyperbolic Partial Differential Equations
- Multiscale Modeling and Simulation
- Mathematical Tools for Scientific Data

EMPLOYMENT / APPOINTMENT HISTORY

10/20- Group Leader, Multiscale Methods Group, ORNL
10/19-09/20 Team Lead, Math for Multiphysics, ORNL
08/09- Research Staff, Computational Science and Mathematics Division, ORNL
10/20- Joint Faculty Professor, Department of Mathematics, University of Tennessee
10/16- Joint Faculty Associate Professor, Department of Mathematics, University of Tennessee
05/11-09/16 Joint Faculty Assistant Professor, Department of Mathematics, University of Tennessee
08/10-05/11 Adjunct Assistant Professor, Department of Mathematics, University of Tennessee
06/06-08/09 Postdoctoral Research Associate, Computational Physics Group, Los Alamos National Laboratory
09/99-06/06 Graduate Research/Teaching Assistant, Department of Mathematics, University of Maryland
10/97-08/99 Engineering Physicist, Doty Scientific Inc., Columbia, SC
05/96-09/97 Undergraduate Research Assistant, Department of Physics, University of South Carolina

AWARDS AND HONORS

2015 Early Career Award, US Department of Energy
2009-2011 Householder Fellowship, Oak Ridge National Laboratory
2005 NSF *Vertical Integration of Research and Education* (VIGRE) research grant
1997 *The Outstanding Achievement and Student Triumph* (TOAST) Award for Outstanding Graduating Senior, College of Science and Mathematics, University of South Carolina

1993-1997 National Merit Scholarship

1993-1997 Alumni Scholarship, University of South Carolina

PRIMARY RESEARCH SUPPORT

- 2020-2024 Agency: DOE NNSA, Los Alamos National Laboratory
Project: *Developing a Better Understanding of Adaptive Velocity Grids for Kinetic Equations*
PI: Cory Hauck (UTK)
- 2019-2021 Agency: ORNL Laboratory Directed Research and Development
Project: *Secure Biosystems Design of Plants and Microbiomes*
PI: Melissa Cregger (ORNL)
- 2019-2024 Agency: DOE Office of Advanced Scientific Computing
Project: *Fundamental Algorithm Research for Quantum Computing*
Director: Ojas Parekh (Sandia National Laboratory)
- 2019-2022 Agency: NSF Division of Mathematical Sciences
Project: *Filtering Strategies for Radiation Transport Equations*
PI: Cory Hauck (UTK)
- 2019-2020 Agency: DOE Office
Project: *Transformational Challenge Reactor Program*
Technical Director: Kurt Terrani (ORNL)
- 2017-2021 Agency: DOE SciDAC Program
Project: *High-fidelity Boundary Plasma Simulation*
Lead PI: C.S. Chang (Princeton Plasma Physics Laboratory)
- 2016-2020 Agency: DOE Office of Science
Project: *Hybrid Methods for Complex Particle Systems*
PI: Cory Hauck (ORNL)
- 2015-2019 Agency: DOE Applied Math Program
Project: *Sparse Recovery for Scientific Data*
PI's: Cory Hauck (ORNL) and Stanley Osher (UCLA)
- 2015-2019 Agency: DOE Applied Math Program
Project: *Modeling the Performance of Extreme Scale Systems*
PI: Cory Hauck (ORNL)
- 2013-2016 Agency: DOE Applied Math Program
Project: *A Mathematical Environment for Quantifying Uncertainty: Integrated and Optimized at the Extreme Scale (EQUINOX)*
Lead PI: Clayton Webster (ORNL)
- 2014-2017 Agency: DOE Applied Math Program
Project: *Moment Methods for Kinetic Equations*
PI: Cory Hauck (ORNL)
- 2014-2015 Agency: ORNL Laboratory Directed Research and Development
Project: *Fast Evaluation of Collision Operators for Modeling Non-Equilibrium Transport*
PI: Eirik Endeve (ORNL)
- 2012-2014 Agency: ORNL Laboratory Directed Research and Development
Project: *Toward Scalable Algorithms for Kinetic Equations: A New Hybrid Approach to Capturing Multiscale Phenomena*
PI: Cory Hauck (ORNL)
- 2012-2013 Agency: ORNL Laboratory Directed Research and Development
Project: *Attacking the Supernova Problem: Nonlinear Moment Models for Simulating Neutrino Radiation*
PI: Cory Hauck (ORNL)

- 2012-2015 Agency: NSF, Division of Mathematical Sciences
Grant: *Optimization-based Moment Models for Multiscale Kinetic Equations*
PI: Cory Hauck (University of Tennessee)
- 2012-2019 Agency: NSF Research Network in Mathematical Sciences (RNMS)
Grant: *Kinetic Description of Emerging Challenges in Multiscale Problems of Natural Sciences*
PI's: Irene Gamba (University of Texas), Shi Jin (University of Wisconsin, Eitan Tadmor (University of Maryland)
- 2010-2012 Agency: DOE Applied Math Program
Project: *Advanced Dynamically Adaptive Algorithms for Stochastic Simulations at Extreme Scales*,
PI's: Richard K. Archibald (ORNL) and Dongbin Xiu (Purdue University)
- 2009-2011 Agency: DOE Applied Math Program
Grant: *Householder Fellowship*
- 2009-2013 Agency: DOE Applied Math Program
Project: *Advanced Optimization Techniques for Entropy-based Moment Closures*
PI's: Cory Hauck (ORNL) and André Tits (University of Maryland)
- 2006-2009 Agency: DOE Applied Math Program
Project: *Mimetic Methods for Partial Differential Equations*
PI: Misha Shashkov (Los Alamos National Laboratory)

JOURNAL PUBLICATIONS

49. V. DECARIA, C. D. HAUCK, AND M. P. LAIU, *Analysis of a new implicit solver for a semiconductor model*, SIAM Journal on Scientific Computing, (in press)
48. S. MADIREDDY, J. H. PARK, S. LEE, P. BALAPRAKASH, S. YOO, W.-K. LIAO, C. D. HAUCK, M. P. LAIU, AND R. ARCHIBALD, *In situ compression artifact removal in scientific data using deep transfer learning and experience replay*, Machine Learning: Science and Technology, 2 (2020), p. 025010
47. R. C. BARNARD, K. HUANG, AND C. HAUCK, *A mathematical model of asynchronous data flow in parallel computers*, IMA Journal of Applied Mathematics, 85 (2020), pp. 865–891
46. V. HENINGBURG AND C. D. HAUCK, *A hybrid finite-volume, discontinuous galerkin discretization for the radiative transport equation*, Multiscale Modeling & Simulation, 19 (2021), pp. 1–24
45. M. P. LAIU, Z. CHEN, AND C. D. HAUCK, *A fast implicit solver for semiconductor models in one space dimension*, Journal of Computational Physics, (2020), p. 109567
44. M. FRANK, J. KUSCH, T. CAMMINADY, AND C. D. HAUCK, *Ray effect mitigation for the discrete ordinates method using artificial scattering*, Nuclear Science and Engineering, (2020), pp. 1–18
43. Z. SUN AND C. D. HAUCK, *Low-memory, discrete ordinates, discontinuous Galerkin methods for radiative transport*, SIAM Journal on Scientific Computing, 42 (2020), pp. B869–B893
42. G. W. ALLDREDGE, M. FRANK, AND C. D. HAUCK, *A regularized entropy-based moment method for kinetic equations*, SIAM Journal on Applied Mathematics, 79 (2019), pp. 1627–1653
41. M. P. LAIU, M. FRANK, AND C. D. HAUCK, *A positive asymptotic-preserving scheme for linear kinetic transport equations*, SIAM Journal on Scientific Computing, 41 (2019), pp. A1500–A1526
40. M. A. PUTHAWALA, C. D. HAUCK, AND S. J. OSHER, *Diagnosing forward operator error using optimal transport*, Journal of Scientific Computing, 80 (2019), pp. 1549–1576
39. C. HAUCK AND V. HENINGBURG, *Filtered discrete ordinates equations for radiative transport*, Journal of Scientific Computing, 80 (2019), pp. 614–648
38. J. M. SCOTT, M. P. LAIU, AND C. D. HAUCK, *Analysis of the zero relaxation limit of hyperbolic balance laws with random initial data*, SIAM/ASA Journal on Uncertainty Quantification, 7 (2019), pp. 806–837
37. R. CHU, E. ENDEVE, C. D. HAUCK, AND A. MEZZACAPPA, *Realizability-preserving dg-imex method for the two-moment model of Fermion transport*, Journal of Computational Physics, (2019)

36. M. M. CROCKATT, A. J. CHRISTLIEB, C. K. GARRETT, AND C. D. HAUCK, *Hybrid methods for radiation transport using diagonally implicit Runge–Kutta and space–time discontinuous Galerkin time integration*, *Journal of Computational Physics*, 376 (2019), pp. 455–477
35. M. P. LAIU AND C. D. HAUCK, *Positivity limiters for filtered spectral approximations of linear kinetic transport equations*, *Journal of Scientific Computing*, 78 (2019), pp. 918–950
34. Z. CHEN AND C. HAUCK, *Multiscale convergence properties for spectral approximations of a model kinetic equation*, *Mathematics of Computation*, 88 (2019), pp. 2257–2293
33. C. K. GARRETT AND C. D. HAUCK, *A fast solver for implicit integration of the Vlasov–Poisson system in the eulerian framework*, *SIAM Journal on Scientific Computing*, 40 (2018), pp. B483–B506
32. G. DIMARCO, C. HAUCK, AND R. LOUBÈRE, *A class of low dissipative schemes for solving kinetic equations*, *Journal of Scientific Computing*, (2018), pp. 1–40
31. W. ZHU, B. WANG, R. BARNARD, C. D. HAUCK, F. JENKO, AND S. OSHER, *Scientific data interpolation with low dimensional manifold model*, *Journal of Computational Physics*, 352 (2018), pp. 213–245
30. J. R. HAACK, C. D. HAUCK, AND M. S. MURILLO, *Interfacial mixing in high-energy-density matter with a multiphysics kinetic model*, *Physical Review E*, 96 (2017), p. 063310
29. J. R. HAACK, C. D. HAUCK, AND M. S. MURILLO, *A conservative, entropic multispecies BGK model*, *Journal of Statistical Physics*, 168 (2017), pp. 826–856
28. M. M. CROCKATT, A. J. CHRISTLIEB, C. K. GARRETT, AND C. D. HAUCK, *An arbitrary-order, fully implicit, hybrid kinetic solver for linear radiative transport using integral deferred correction*, *Journal of Computational Physics*, 346 (2017), pp. 212–241
27. I. M. GAMBA, J. R. HAACK, C. D. HAUCK, AND J. HU, *A fast spectral method for the Boltzmann collision operator with general collision kernels*, *SIAM Journal on Scientific Computing*, 39 (2017), pp. B658–B674
26. M. P. LAIU, C. D. HAUCK, R. G. MCCLARREN, D. P. O’LEARY, AND A. L. TITS, *Positive filtered PN moment closures for linear kinetic equations*, *SIAM Journal on Numerical Analysis*, 54 (2016), pp. 3214–3238
25. C. K. GARRETT AND C. D. HAUCK, *On the eigenstructure of spherical harmonic equations for radiative transport*, *Computers & Mathematics with Applications*, 72 (2016), pp. 264–270
24. V. M. LABOURE, R. G. MCCLARREN, AND C. D. HAUCK, *Implicit filtered PN for high-energy density thermal radiation transport using discontinuous Galerkin finite elements*, *Journal of Computational Physics*, 321 (2016), pp. 624–643
23. M. FRANK, C. HAUCK, AND K. KUEPPER, *Convergence of filtered spherical harmonic equations for radiation transport*, *Commun. Math. Sci*, 14 (2016), pp. 1443–1465
22. C. K. GARRETT, C. HAUCK, AND J. HILL, *Optimization and large scale computation of an entropy-based moment closure*, *Journal of Computational Physics*, 302 (2015), pp. 573–590
21. E. ENDEVE, C. D. HAUCK, Y. XING, AND A. MEZZACAPPA, *Bound-preserving discontinuous Galerkin methods for conservative phase space advection in curvilinear coordinates*, *Journal of Computational Physics*, 287 (2015), pp. 151–183
20. L. CHACÓN, D. DEL CASTILLO-NEGRETE, AND C. D. HAUCK, *An asymptotic-preserving semi-lagrangian algorithm for the time-dependent anisotropic heat transport equation*, *Journal of Computational Physics*, 272 (2014), pp. 719–746
19. G. W. ALLDREDGE, C. D. HAUCK, D. P. O’LEARY, AND A. L. TITS, *Adaptive change of basis in entropy-based moment closures for linear kinetic equations*, *Journal of Computational Physics*, 258 (2014), pp. 489–508
18. C. HAUCK, Y. SUN, AND I. TIMOFEYEV, *On cellular automata models of traffic flow with look-ahead potential*, *Stochastics and Dynamics*, 14 (2014), p. 1350022
17. E. OLBRANT, C. D. HAUCK, AND M. FRANK, *Perturbed, entropy-based closure for radiative transfer*, *Kinetic and Related Models*, 6 (2013), pp. 557–587
16. C. D. HAUCK AND R. G. MCCLARREN, *A collision-based hybrid method for time-dependent, linear, kinetic transport equations*, *Multiscale Modeling & Simulation*, 11 (2013), pp. 1197–1227

15. C. K. GARRETT AND C. D. HAUCK, *A comparison of moment closures for linear kinetic transport equations: The line source benchmark*, *Transport Theory and Statistical Physics*, 42 (2013), pp. 203–235
14. V. VIKAS, C. D. HAUCK, Z. J. WANG, AND R. O. FOX, *Radiation transport modeling using extended quadrature method of moments*, *Journal of Computational Physics*, 246 (2013), pp. 221–241
13. H. SCHAEFFER, R. CAFLISCH, C. D. HAUCK, AND S. OSHER, *Sparse dynamics for partial differential equations*, *Proceedings of the National Academy of Sciences*, 110 (2013), pp. 6634–6639
12. E. OLBRANT, C. D. HAUCK, AND M. FRANK, *A realizability-preserving discontinuous Galerkin method for the $m1$ model of radiative transfer*, *Journal of Computational Physics*, 231 (2012), pp. 5612–5639
11. G. W. ALLDREDGE, C. D. HAUCK, AND A. L. TITS, *High-order entropy-based closures for linear transport in slab geometry II: A computational study of the optimization problem*, *SIAM Journal on Scientific Computing*, 34 (2012), pp. B361–B391
10. C. D. HAUCK, *High-order entropy-based closures for linear transport in slab geometry*, *Communications in Mathematical Sciences*, 9 (2011), pp. 187–205
9. R. G. MCCLARREN AND C. D. HAUCK, *Robust and accurate filtered spherical harmonics expansions for radiative transfer*, *Journal of Computational Physics*, 229 (2010), pp. 5597–5614
8. R. G. MCCLARREN AND C. D. HAUCK, *Simulating radiative transfer with filtered spherical harmonics*, *Physics Letters A*, 374 (2010), pp. 2290–2296
7. C. D. HAUCK AND R. B. LOWRIE, *Temporal regularization of the PN equations*, *Multiscale Modeling & Simulation*, 7 (2009), pp. 1497–1524
6. C. HAUCK AND R. MCCLARREN, *Positive PN closures*, *SIAM Journal on Scientific Computing*, 32 (2010), pp. 2603–2626
5. J. R. HAACK AND C. D. HAUCK, *Oscillatory behavior of asymptotic-preserving splitting methods for a linear model of diffusive relaxation*, *Kinetic and Related Models*, 1 (2008), pp. 573–590
4. C. D. HAUCK, C. D. LEVERMORE, AND A. L. TITS, *Convex duality and entropy-based moment closures: Characterizing degenerate densities*, *SIAM Journal on Control and Optimization*, 47 (2008), pp. 1977–2015
3. S. AHMED, R. BUCKINGHAM, P. GREMAUD, C. HAUCK, C. KUSTER, M. PRODANOVIC, T. ROYAL, AND V. SILANTYEV, *Volume determination for bulk materials in bunkers*, *International journal for numerical methods in engineering*, 61 (2004), pp. 2239–2249
2. F. D. DOTY, G. ENTZMINGER JR, C. D. HAUCK, AND J. P. STAAB, *Practical aspects of birdcage coils*, *Journal of magnetic resonance (San Diego, Calif.: 1997)*, 138 (1999), pp. 144–154
1. F. D. DOTY, G. ENTZMINGER JR, AND C. D. HAUCK, *Error-tolerant rf litz coils for NMR/MRI*, *Journal of Magnetic Resonance*, 140 (1999), pp. 17–31

OTHER PEER-REVIEWED PUBLICATIONS

7. V. SOBES, B. HISCOX, E. POPOV, M. DELCHINI, R. ARCHIBALD, C. HAUCK, P. LAIU, B. BETZLER, AND K. TERRANI, *Artificial intelligence design of nuclear systems empowered by advanced manufacturing*, in *EPJ Web of Conferences*, vol. 247, EDP Sciences, 2021, p. 06032
6. V. M. LABOURE, R. G. MCCLARREN, AND C. D. HAUCK, *Implicit filtered P_N method in cylindrical coordinates for thermal radiation transport*, in *Proceeding of the Joint International Conference on Mathematics and Computation (M&C), Supercomputing in Nuclear Applications (SNA) and the Monte Carlo (MC) Method*, N. Pogorelov, E. Audit, and G. Zank, eds., American Nuclear Society, April 2015
5. E. ENDEVE, C. HAUCK, Y. XING, AND T. MEZZACAPPA, *Towards robust discontinuous Galerkin methods for general relativistic neutrino radiation transport*, in *Astronomical Society of the Pacific Conference Series*, N. Pogorelov, E. Audit, and G. Zank, eds., Astronomical Society of the Pacific, June 2014, pp. 59–64
4. C. D. HAUCK, R. G. MCCLARREN, AND R. B. LOWRIE, *Methods for diffusive relaxation in the P_N equation*, vol. 1, Dipartimento di Matematica della Seconda Università di Napoli, 2009, pp. 100–243
3. R. G. MCCLARREN AND C. D. HAUCK, *Positive P_N closures with local optimization*, in *Transactions of the 2009 American Nuclear Society Winter Meeting and Nuclear Technology Expo*, American Nuclear Society,

November 2009

2. R. G. MCCLARREN, C. D. HAUCK, AND R. B. LOWRIE, *Filtered spherical harmonic methods for transport equations*, in Proceedings of the International Conference on Mathematics, Computational Methods, and Reactor Physics, American Nuclear Society, May 2009
1. C. HAUCK, D. LEVERMORE, AND A. TITS, *Convex duality and entropy-based moment closures: Characterizing degenerate densities*, in Proceedings of the 47th IEEE Conference on Decision and Control, IEEE, December 2008

INVITED TALKS AND PRESENTATIONS

- 0142021 *Discontinuous Galerkin Methods and the Diffusion Limit*
Computational Analysis Seminar
Vanderbilt University (virtual)
- 01/2021 *Discontinuous Galerkin Methods and the Diffusion Limit*
Seminar series on Hyperbolic Equations: Structure Preserving Methods and Other Topics
University of Würzburg (virtual)
- 02/2021 *Kinetic Models of Particle Systems*
Mathematics Colloquium
Department of Mathematics
University of Arizona (virtual)
- 01/2021 *Kinetic Models of Particle Systems*
Mathematics Colloquium
Department of Mathematics
Oregon State University (virtual)
- 09/2020 *Implicit Solution of the Vlasov-Poisson System*
Applied Math Seminar
Department of Mathematics
University of Georgia (virtual)
- 11/2019 *A Mathematical Model of Asynchronous Data Flow in Parallel Computers*
Computational Science Seminar
Center for Scientific Computing and Visualization Research
University of Massachusetts, Dartmouth
- 04/2019 *Discontinuous Galerkin Methods and the Diffusion Limit*
Junior Kinetic Workshop (Faculty Speaker),
University of Wisconsin
- 02/2019 *Hybrid Methods for Radiation Transport*
Minisymposium on Structure Preserving Techniques for Hyperbolic Systems
SIAM Conference on Computational Science and Engineering
- 10/2018 *Implicit Solution of the Vlasov-Poisson System*
Computational Mathematics Colloquium
Department of Mathematical and Statistical Sciences
University of Colorado, Denver
- 07/2018 *A Collision-Based Hybrid Method for Linear Transport*
Minisymposium on Modeling and Numerical Simulation of Non-Equilibrium Processes
13th World Congress in Computational Mechanics, New York
- 07/2018 *A Positive Asymptotic Preserving Scheme for Linear Kinetic Transport Equations*
Minisymposium on Modeling and Numerical Simulation of Non-Equilibrium Processes
13th World Congress in Computational Mechanics, New York
- 07/2018 *A Positive Asymptotic Preserving Scheme for Linear Kinetic Transport Equations*
Special Session on High Order Methods for Hyperbolic Problems with an Emphasis on Applications,
International Conference on Spectral and High Order Methods

- Imperial College, London
- 05/2018 *Multiscale Convergence Properties for Spectral Approximations of a Model Kinetic Equation*
Seminar on Wave Phenomena
Karlsruhe Institute of Technology
- 04/2018 *Hybrid Methods for Complex Particle Systems*
Advanced Scientific Computing Advisory Committee (ASCAC) Meeting
Arlington, VA
- 05/2017 *Hybrid, Multi-Level, and Asymptotic Preserving Methods for Kinetic Equations*
2017 Workshop on Computational Challenges in Plasma Physics
Air Force Office of Scientific Research
- 04/2017 *A Scattering-based Hybrid Method for Linear Transport*
Computational and Applied Math Seminar
University of Tennessee
- 04/2017 *Implicit Solution of the Vlasov-Poisson System*
Center for Computational Engineering Science-Mathematics Division (MathCCES)
RWTH, Aachen, Germany
- 03/2017 *Implicit Solution of the Vlasov-Poisson System*
Mini-symposium on Advances in Numerical Methods and Algorithms for Radiation Transport
SIAM Conference on Computational Science and Engineering, Atlanta, GA
- 10/2016 *Implicit Solution of the Vlasov-Poisson System*
Computational and Applied Math Seminar, University of Tennessee
- 09/2016 *Discontinuous Galerkin Methods for Transport Equations and the Diffusion Limit*
Department of Computational Mathematics, Science and Engineering
Michigan State University
- 04/2016 *Filtered Spherical Harmonic Methods for Radiation Transport*
Center for Computational & Applied Mathematics
Purdue University
- 04/2016 *Filtered Spherical Harmonic Methods for Radiation Transport*
Center for Computational Sciences and Mathematical Modeling
University of Maryland
- 04/2016 *Implicit Solution of the Vlasov-Poisson System*
Workshop on Boundary-value Problems and Multi-scale Coupling Methods for Kinetic Equations
University of Wisconsin
- 09/2015 *A Scattering-based Hybrid Method for Linear Transport*
Numerical Analysis Seminar
North Carolina State University
- 09/2015 *Filtered Spherical Harmonic Methods for Radiation Transport*
Applied Mathematics and Analysis Seminar
Duke University
- 07/2015 *Positive, Filtered Spherical Harmonics*
Center for Computational Engineering Science-Mathematics Division (MathCCES)
RWTH, Aachen, Germany
- 07/2015 *Numerical Topics in Collisional Kinetic Equations: Moment Models, Asymptotic Preserving Methods, and Hybrid Approaches*
EU Regional Summer School in Computational Engineering Science
Aachen Institute for Advanced Study in Computational Engineering Sciences
- 05/2015 *Filtered Spectral Methods for Transport Problems*
Workshop on Higher Order Numerical Methods for Evolutionary PDEs: Applied Mathematics Meets Astrophysical Applications
Banff International Research Station

- 03/2015 *Two-Level Sampling Strategies for Hyperbolic Systems with Relaxation*
Ki-Net Workshop on Uncertainty Quantification in Kinetic and Hyperbolic Problems
University of Wisconsin
- 12/2014 *A Scattering-based Hybrid Method for Linear Transport*
Workshop on Computational Methods in High Energy Density Plasmas
Institute for Pure and Applied Mathematics (IPAM)
- 08/2014 *Recent Progress on the Implementation of Entropy-based Moment Closures*
Workshop on Moment Methods in Kinetic Theory II
Fields Institute, University of Toronto
- 07/2014 *Filtered Spectral Methods for Transport Problems*
SIAM Annual Meeting, Chicago
- 04/2014 *Recent Progress on the Implementation of Entropy-based Moment Closures*
Applied and Computational Mathematics Seminar
University of Tennessee
- 03/2014 *Discontinuous Galerkin Methods for Transport Equations and the Diffusion Limit*
Workshop on Asymptotic-Preserving Methods for Kinetic Equations
North Carolina State University
- 03/2014 *Discontinuous Galerkin Methods for Transport Equations and the Diffusion Limit*
Mathematics & Statistics Colloquium
Old Dominion University
- 02/2014 *Recent Progress on the Implementation of Entropy-based Moment Closures*
Applied and Computational Mathematics Seminar
Tulane University
- 02/2014 *Computational Aspects of Kinetic Theory*
Mathematics Colloquium
Tulane University
- 12/2013 *A Brief Introduction to Asymptotic Preserving Methods*
Workshop on Kinetic Processes in Extreme States of Matter
Los Alamos National Laboratory
- 09/2013 *Discontinuous Galerkin Methods for Transport Equations and the Diffusion Limit*
Conference on Numerical Approximations of Hyperbolic Systems With Source Terms and Applications
RWTH Aachen, Germany
- 09/2013 *Recent Progress on the Implementation of Entropy-based Moment Closures*
Séminaire de Mathématiques Appliquées
Institut de Mathématiques de Bordeaux
- 01/2013 *A Collision-based Hybrid Method for Linear Transport*
Institute for Pure and Applied Mathematics (IPAM)
- 02/2012 *Entropy-based Closures for Linear Transport*
Department of Mathematics, Simon Fraser University
- 04/2012 *High-order, Entropy-based Models for Linear Transport in Slab Geometries*
Center for Computational Engineering Science-Mathematics Division (MathCCES)
RWTH, Aachen, Germany
- 03/2012 *High-order, Entropy-based Models for Linear Transport in Slab Geometries*
Workshop on Hot Dense Plasmas
Institute for Pure and Applied Mathematics (IPAM)
- 12/2011 *High-order, Entropy-based Models for Linear Transport in Slab Geometries*
Second Reunion Conference on Quantum and Kinetic Transport,
Institute for Pure and Applied Mathematics (IPAM)
- 11/2011 *A Collision-based Hybrid Method for Linear Transport*
Workshop on Boltzmann Models in Kinetic Theory

- Institute for Computational and Experimental Research in Mathematics (ICERM)
- 10/2011 *Optimization-based Closures for Radiative Transport*
Computational Fluid Dynamics Seminar, Iowa State University
- 10/2011 *High-order, Entropy-based Models for Linear Transport in Slab Geometries*
Workshop on *Novel Applications of Kinetic Theory and Computations*
Institute for Computational and Experimental Research in Mathematics (ICERM)
- 10/2011 *Optimization-based Methods for Discretization of Partial Differential Equations*
Center for Scientific Computation and Mathematical Modeling
University of Maryland, College Park.
- 05/2011 *A COLLISION-BASED HYBRID METHOD FOR LINEAR TRANSPORT*
Annual Meeting, NSF Focused Research Group on Kinetic Theory
University of Wisconsin
- 01/2011 *A Collision-based Hybrid Method for Linear Transport*
Institute for Computational and Engineering Sciences (ICES)
University of Texas at Austin
- 11/2010 *A Collision-based Hybrid Method for Linear Transport*
Center for Computational Engineering Science-Mathematics Division (MathCCES)
RWTH, Aachen, Germany
- 10/2010 *Optimization-based Moment Closures in Kinetic Theory and Transport*
Applied Mathematics and Mathematical Physics Seminar
Imperial College, London
- 05/2010 *Advanced Optimization Techniques for Entropy-based Moment Closures*
2010 DOE Applied Mathematics Program Meeting, Berkeley, CA
- 03/2010 *Optimization-based Closures for Radiation Transport*
Numerical Analysis Seminar
North Carolina State University
- 03/2010 *Optimization-based Moment Closures in Kinetic Theory and Transport*
Mathematics and Statistics Colloquium
Old Dominion University
- 02/2010 *A Numerical Regularization Technique for Multi-Scale, Linear Transport Models*
Computational and Applied Math Seminar
University of Tennessee
- 11/2009 *Optimization-based Closures for Radiation Transport*
Applied Mathematics / PDE Seminar
University of Wisconsin
- 11/2009 *Optimization-based Closures for Radiation Transport*
Applied Mathematics Seminar, Michigan State University
- 04/2009 *Realizability in Entropy-based Moment Closures for Gas Dynamics*
Workshop on "The Boltzmann Equation: DiPerna-Lions Plus 20 Years"
Institute for Pure and Applied Mathematics, UCLA
- 02/2009 *Model Reduction and Asymptotic Preserving Numerical Methods for Kinetic Transport Equations*
Computer Science and Mathematics Division Seminar
Oak Ridge National Laboratory.
- 02/2009 *Some Computational Aspects of Kinetic Transport Equations*
Mathematics Colloquium
University of South Carolina
- 11/2008 *A Numerical Regularization Technique for Multi-Scale, Linear Transport Models*
Applied Mathematics Seminar
Texas A&M University

- 09/2008 *A Numerical Regularization Technique for Multi-Scale, Linear Transport Models*
Applied Mathematics Seminar
North Carolina State University
- 02/2008 *Temporal Regularization of the P_N Equations*
Applied Mathematics Seminar
University of Wisconsin
- 08/2005 *Perturbations to Entropy Minimization Hydrodynamic Closures*
Mathematics Department Seminar
University of Texas at Austin
- 08/2005 *A Numerical Splitting Method for a Hydrodynamic Model of Electron Transport*
Center for Nonlinear Studies
Los Alamos National Laboratory

TEACHING AND ADVISING

- Courses taught at University of Maryland
 - MATH 110, *Elementary Mathematical Models*
 - MATH 111, *Introduction to Probability*
 - MATH 115, *Elements of Pre-Calculus*
 - MATH 211, *Elements of Geometry* (now MATH 213)
 - MATH 241, *Calculus III*
 - MATH 246, *Differential Equations for Scientists and Engineers*
- Short Courses
 - *Introduction to Conservation Laws*
Los Alamos Summer School, 2008
 - *Numerical Topics in Collisional Kinetic Equations: Moment Models, Asymptotic Preserving Methods, and Hybrid Approaches*
EU Regional School, RWTH Aachen, 2015
- Ph.D. Students
 - Evan Habbershaw, University of Tennessee, current
 - Ben Plumridge, University of Tennessee, current
 - Vincent Heningburg, University of Tennessee, 2019
Thesis Topic: *Numerical Methods for Radiative Transport Equations*
Current Position: Unknown
 - M. Paul Laiu, University of Maryland, 2016
Thesis Title: *Positive Filtered P_N Method for Linear Transport Equations and the Associated Optimization Algorithm*
Current Position: Research Staff, Oak Ridge National Laboratory
(co-advisor with André L. Tits)
 - Graham W. (Alldredge) Kaland, University of Maryland 2012,
Thesis Title: *Optimization Techniques for Entropy-based Moment Models of Linear Transport*
Current Position: Researcher, Freie Universität Berlin
(co-advisor with André L. Tits)
- Postdoctoral Supervisees
 - Stefan Schnake, 2020 - current
 - Victor Decaria, 2019 - current
 - M. Paul Liau, 2017 - 2019
Current Position: Staff Scientist, Oak Ridge National Laboratory
 - Zheng (Leslie) Chen, 2016 - 2019
Current Position: Tenure Track Assistant Professor, University of Massachusetts at Dartmouth

- Richard C. Barnard, 2015 - 2019 (joint with Richard K. Archibald)
Current Position: Tenure Track Assistant Professor, Western Washington University
- Qiwei Sheng, 2015 - 2016
Current Position: Tenure Track Assistant Professor, California State University Bakersfield
- C. Kristopher Garrett, 2013 - 2015
Current Position: HPC Engineer at Bell Flight
- Ph.D. Thesis Committees
 - Ran Chu, University of Tennessee, current
 - Daniel Murphy, University of Tennessee, current
 - Michael Puthawala, UCLA, 2019
 - Kerstin Küpper, RWTH Aachen University, 2017
 - Teddy Pichard, University of Bordeaux, 2016
 - Thomas Weber, University of Houston, 2016
 - Ming Zhong, University of Maryland, 2016
 - Edgar Olbrant, RWTH Aachen University, 2012
- Graduate Student Interns
 - Andres Galindo, Michigan State University, Spring 2020
Project: *Numerical Analysis for a Hybrid Transport Solver*
 - Xiaodong Huang, Purdue University, Spring 2020
Project: *Sparse Methods for Evaluating the Boltzmann Collision Operator*
 - Samantha Clapp, University of Tennessee, Spring 2019
Project: *Kinetic Data on Discrete Grids*
 - Anna Sisk, University of Tennessee, Summer 2018 Project: *On a Gradient System Related to the Quadratic Binary Unconstrained Optimization (QUBO) Problem*
 - James Scott, University of Tennessee, Summer 2016 and Spring 2017
Project: *Hyperbolic Relaxation Laws in the Stochastic Setting*
 - Michael Puthawala, UCLA, Summer 2016 and Summer 2017
Project: *Inverse Problems for Plasma X-ray Imaging*
 - Michael Crockatt, Summer 2014, Summer 2015, Summer 2016, Summer 2017
Project: *High-Order Time Integration Methods for Hybrid Methods of Radiation Transport*
 - Zheng Sun, Brown University, Summer 2017 and Summer 2018
Project: *Low-Memory, Asymptotic Preserving DG Methods for Radiation Transport*
 - Ming-Tse (Paul) Laiu, University of Maryland, Spring 2014 and Calendar Year 2015
Project: *Moment Methods for Linear Kinetic Equations*
 - Ming Zhong, University of Maryland, Summer 2015
Project: *ODE Models of Data Flow in High Performance Computers*
 - Kerstin Küpper, RWTH Aachen University, Spring 2015
Project: *Two Level Sampling Strategies for Uncertainty Quantification in Hyperbolic Relaxation Systems*
 - Thomas Weighill, University of Tennessee, Spring 2015
Project: *Hyperbolic Moment Closure for Gas Dynamics*
 - James Cheung, Florida State University, Summer 2014
Project: *Two Level Sampling Strategies for Uncertainty Quantification in Hyperbolic Relaxation Systems*
 - Bingyu Zhao, Brown University, Summer 2014
Project: *Maximum Principle Preserving Methods with Implicit Time Integration*
 - Vincent Laboure, Texas A&M University, Summer 2008 and Summer 2009
Project: *Implicit Implementation of Filtered P_N Equations*
 - C. Kristopher Garrett, Summer 2010 and Summer 2011
Project: *Scalable Optimization-based Moment Closures for Kinetic Equations*

- Meiyun He, University of Maryland, Summer 2008 and Summer 2009
Project: *The M_3 Model of Radiative Transport*
- Jeffrey R. Haack, University of Wisconsin, Summer 2008 and Summer 2009
Project: *Asymptotic Preserving Methods for Transport and Fluid Equations*
- Undergraduate / Postgraduate Interns
 - William Porteus, University of Chicago, Fall 2019
Project: *Machine Learning for Entropy-Based Closures*
 - Abigail Hueske, Texas A&M University, Summer 2010
Project: *Efficient Discretization for Multi-Scale Transport Equations*
 - Muhammad Saad Shamim, Rice University, Summer 2012
Project: *A Discontinuous Galerkin Method for the M_1 Model of Radiative Transfer*

SERVICE

- Journal Editor: *SIAM Multiscale Modeling and Simulation* (2015 - present)
- Journal Referee: *ACM Transactions on Mathematical Software, Analysis and Mathematical Physics, Applied Mathematics and Computation, Communications in Mathematical Sciences, Continuum Mechanics and Thermodynamics, International Journal of Numerical Analysis and Modeling, Journal of Computational Physics, The Journal of Computational and Theoretical Transport, Journal of Quantitative Spectroscopy and Radiative Transfer, Journal of Scientific Computing, Mathematical Modeling and Numerical Analysis, Nuclear Science and Engineering SIAM Journal on Applied Mathematics, SIAM Journal on Numerical Analysis, SIAM Journal on Scientific Computing, SIAM Journal on Uncertainty Quantification, SIAM Review, Transport Theory and Statistical Physics, Zeitschrift für angewandte Mathematik und Physik*
- Conference Organization:
 - 2015 Committee Chair, Conference on *Scalable Methods for Kinetic Equations*, Oak Ridge National Laboratory
 - 2015 Co-organizer, Mini-symposia on *Computational Methods for Kinetic Equations and Related Models and Hybrid and multilevel approaches to kinetic simulations*, SIAM Conference on Computational Science & Engineering
 - 2013 Committee Chair, SIAM Southeastern-Atlantic Section (SEAS) Annual Meeting
 - 2013 Co-organizer, Mini-symposium on *Computational Methods for Kinetic Equations and Related Models*, SIAM Conference on Computational Science & Engineering
 - 2012 Member of the Technical Committee, Workshop on *Algorithm and Model Verification and Validation For Kinetic Plasma Simulation Codes*, Michigan State University
 - 2011 Co-organizer, Mini-symposium on *Advanced Numerical Methods for Kinetic Simulations and Their Applications*, 7th International Congress on Industrial and Applied Mathematics
 - 2010 Co-organizer, Mini-symposium on *Numerical Methods for Kinetic Equations and Related Models*, SIAM Annual Meeting
 - 2009 Organizer, Mini-symposium on *Moment Closures for Kinetic and Hyperbolic Equations*, SIAM Annual Meeting
 - 2008 Organizer, Postdoc Seminar Series, Center for Nonlinear Studies, Los Alamos National Laboratory
- Panels / Committees:
 - 2020-2021 Member, Technical Program Committee, 2021 International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering
 - 2019 Co-Lead for *Foundations of Artificial Intelligence*, DOE AI for Science Town Hall Meetings
 - 2019-2020 Member, Initiative Review Committee, Nuclear Science and Technology, Laboratory Directed Research and Development, ORNL
 - 2017-2019 Organizer, *University of Tennessee Graduate Student Orientation Site Visit*, Oak Ridge National Laboratory
 - 2014-2020 Committee Chair, *Householder Seminar Series*, Oak Ridge National Laboratory/University of Tennessee

2013,2014,2017 Awards Committee, Computer Science and Mathematics Division, ORNL

2017 Alternate Member, Postdoctoral Program Advisory Committee, ORNL

2013-2019 Householder Fellowship Committee, ORNL

2015 Participant, DOE Workshop on *Integrated Simulations for Magnetic Fusion Energy Sciences*, Panel on Multiphysics and Multiscale Coupling

2011 Participant, DOE Workshop for *Mathematics for the Analysis, Simulation, and Optimization of Complex Systems*