

Curriculum Vitae

Wei Guo

Department of Mathematics and Statistics
Texas Tech University
Lubbock, TX, 49409

Email: weimath.guo@ttu.edu

Education

- Ph.D. in Applied Mathematics, University of Houston (2011–2014).
Advisor: Professor Jing-Mei Qiu
- M.S. in Computational Mathematics, Nanjing University (2007–2010).
Advisor: Professor Jian-Xian Qiu
- B.S. in Information and Computational Science, Nanjing University (2003–2007).

Professional Appointments

- Assistant professor, Texas Tech University (Sept. 2017 – present).
- Visiting research associate, Michigan State University (Aug. 2014 – Aug. 2017).
Advisor: Professor Andrew Christlieb

Research Interests

- High order numerical methods for hyperbolic conservation laws and Hamilton-Jacobi equations.
- High order semi-Lagrangian methods and their applications in kinetic simulations and atmospheric modelings.
- Dimension reduction methods with high order accuracy for high-dimensional PDEs, including sparse grids approach and low-rank tensor approach.
- Kernel-based methods for efficient time-dependent simulations.

Grant

- Sole PI: NSF-DMS-1620047 (transferred to NSF-DMS-1830838), *Development and Application of Efficient High-order Semi-Lagrangian Schemes*, National Science Foundation, Division of Mathematical Science, \$79,713 (2016–2020).

Awards and Honors

- Friends of NSM Graduate Fellowship (\$5000), University of Houston (2013).
- Scholarship for Excellent Master Graduates, Nanjing University (2008).

Professional Experience

- **Visiting Researcher**, Research and Supercomputing Visitor Program (RSVP) at Computational & Information Systems Lab (CISL), National Center for Atmospheric Research (NCAR), Boulder, CO (July–Aug. 2014).
- **Summer Intern**, Pacific Northwest National Laboratory (PNNL), Richland, WA (May–Aug. 2013).
Mentor: Dr. Guang Lin.
- **Summer Intern**, Summer Internship in Parallel Computational Science (SIParCS) at CISL, NCAR, Boulder, CO (May–Aug. 2012).
Mentor: Dr. Ram Nair.
- **Visiting Researcher**, Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University, Providence, RI (Sept.–Dec. 2011).

Publications/Preprints

1. W. Guo, “A sparse grid discontinuous Galerkin method for the high-dimensional Helmholtz equation with variable coefficients”, *submitted*.
2. M. Ding, X. Cai, W. Guo, and J.-M. Qiu “A semi-Lagrangian discontinuous Galerkin (DG)-local DG method for solving convection-diffusion-reaction equations”, *submitted*.
3. X. Cai, W. Guo, and J.-M. Qiu, “Comparison of semi-Lagrangian discontinuous Galerkin schemes for linear and nonlinear transport simulations”, *submitted*.
4. A. Christlieb, W. Guo, Y. Jiang, and H. Yang, “Kernel based high order “explicit” A-stable scheme for nonlinear degenerate advection-diffusion equations”, *accepted*.
5. Z. Tao, W. Guo, and Y. Cheng, “Sparse grid discontinuous Galerkin methods for the Vlasov-Maxwell system”, **Journal of Computational Physics: X**, v3 (2019), 100022.
6. A. Christlieb, W. Guo, Y. Jiang, and H. Yang, “A moving mesh WENO method based on exponential polynomials for one-dimensional conservation laws”, **Journal of Computational Physics**, v380 (2019), pp.334–354.
7. A. Christlieb, W. Guo, and Y. Jiang, “A kernel based high order explicit” unconditionally stable scheme for time dependent Hamilton-Jacobi equations”, **Journal of Computational Physics**, v379 (2019), pp.214–236.
8. X. Cai, W. Guo, and J.-M. Qiu, “A high order semi-Lagrangian discontinuous Galerkin method for the two-dimensional incompressible Euler equations and the guiding center Vlasov model without operator splitting”, **Journal of Scientific Computing**, v79 (2019), pp.1111–1134.

9. G. Ke and W. Guo, “An alternative formulation of discontinuous Galerkin schemes for solving Hamilton-Jacobi equations”, **Journal of Scientific Computing**, v78 (2019), pp.1023–1044.
10. X. Cai, W. Guo, and J.-M. Qiu, “A high order semi-Lagrangian discontinuous Galerkin method for Vlasov-Poisson simulations without operator splitting”, **Journal of Computational Physics**, v354 (2018), pp.529–551.
11. W. Guo, and Y. Cheng, “An adaptive multiresolution discontinuous Galerkin method for time-dependent transport equations in multi-dimensions”, **SIAM Journal on Scientific Computing**, v39 (2017), pp.A2962–A2992.
12. X. Cai, W. Guo, and J.-M. Qiu, “A high order conservative semi-Lagrangian discontinuous Galerkin method for two-dimensional transport simulations”, **Journal of Scientific Computing**, v73 (2017), pp.514–542.
13. Y. Cheng, A. Christlieb, W. Guo, and B. Ong, “An asymptotic preserving Maxwell solver resulting in the Darwin limit of electrodynamics”, **Journal of Scientific Computing**, v71 (2017), pp.959–993.
14. A. Christlieb, W. Guo, and Y. Jiang, “A WENO-based method of lines transpose approach for Vlasov simulations”, **Journal of Computational Physics**, v327 (2016), pp.337–367.
15. W. Guo and Y. Cheng, “A sparse grid discontinuous Galerkin method for high-dimensional transport equations and its application to kinetic simulations”, **SIAM Journal on Scientific Computing**, v38 (2016), pp. A3381–A3409.
16. W. Guo, G. Lin, A. Christlieb, and J.-M. Qiu, “An adaptive WENO collocation method for differential equations with random coefficients”, **MDPI**, Special Issue “New Trends in Applications of Orthogonal Polynomials and Special Functions”, 2016.
17. Z. Wang, Q. Tang, W. Guo, and Y. Cheng, “Sparse grid discontinuous Galerkin methods for high-dimensional elliptic equations”, **Journal of Computational Physics**, v314 (2016), pp.244–263.
18. W. Guo, R. D. Nair, and X.-H. Zhong, “An efficient WENO limiter for discontinuous Galerkin transport scheme on the cubed sphere”, **International Journal for Numerical Methods in Fluids**, v81 (2015), pp.3–21.
19. W. Guo, J.-M. Qiu, and J.-X. Qiu, “A new Lax-Wendroff discontinuous Galerkin method with superconvergence”, **Journal of Scientific Computing**, v65 (2015), pp.299–326.
20. A. Christlieb, W. Guo, M. Morton, and J.-M. Qiu, “A high order time splitting method based on integral deferred correction for semi-Lagrangian Vlasov simulations”, **Journal of Computational Physics**, v267 (2014), pp.7–27.

21. W. Guo, R. D. Nair, and J.-M. Qiu, “A conservative semi-Lagrangian discontinuous Galerkin method for transport equation on the cubed-sphere”, **Monthly Weather Review**, v142 (2014), pp.457–475.
22. W. Guo, X.-H. Zhong, and J.-M. Qiu, “Superconvergence of discontinuous Galerkin and local discontinuous Galerkin methods: eigen-structure analysis based on Fourier approach”, **Journal of Computational Physics**, v235 (2013), pp.458–485.
23. W. Guo and J.-M. Qiu, “Hybrid semi-Lagrangian finite element-finite difference methods for the Vlasov equation”, **Journal of Computational Physics**, v234 (2013), pp.108–132.
24. W. Guo, F. Li, and J.-X. Qiu, “Local-structure-preserving discontinuous Galerkin methods with Lax-Wendroff type time discretizations for Hamilton-Jacobi equations”, **Journal of Scientific Computing**, v47 (2011), pp.239–257.

Conferences/Workshops

- Organizer/Co-organizer:
 - Recent Advances in High Order Methods for Time Dependent PDEs, 9th International Congress on Industrial and Applied Mathematics (ICIAM 2019), Valencia, Spain (July 2019).
 - Current Trends in Numerical Analysis and Scientific Computing, XVII Red Raider Minisymposium, Lubbock, TX (Oct. 2018).
 - Advances in Computational Methods for Hyperbolic and Other Time Dependent Problems, SIAM Annual Meeting, Portland, OR (July 2018).
 - Recent Development and Application on High Order Methods for Time-Dependent PDEs (I, II), SIAM Annual Meeting, Boston, MA (July 2016).
- Invited and Contributed Talks:
 - SIAM Conference on Analysis of Partial Differential Equations, La Quinta, CA (Dec. 2019).
 - Conference on Computational Mathematics and Applications, Las Vegas, NV (Oct. 2019).
 - SIAM Conference on Computational Science and Engineering, Spokane, WA (Feb.–Mar. 2019).
 - The 4th Annual Meeting of SIAM Central States Section, Norman, OK (Oct. 2018).
 - Seminar in the School of Mathematical Sciences, Zhejiang University, Hangzhou, China (Jun. 2018).
 - Seminar in the School of Mathematical Sciences, Xiamen University, Xiamen, China (Jun. 2018).
 - The 4th International Workshop on the Development of Application of High-Order Numerical Methods, Nanjing University, Nanjing, China (May 2018).

- Numerical Analysis and PDE Seminar, University of Delaware, Newark, DE (Oct. 2017).
 - AMS Eastern Sectional Meeting, Fall 2017, Buffalo, NY (Sept. 2017).
 - The 3rd Annual Meeting of SIAM Central States Section, Fort Collins, CO (Sept. 2017).
 - Seminar in Applied Mathematics, Department of Mathematics and Statistics, Texas Tech University, Lubbock, TX (Oct. 2017).
 - Scientific Computing Seminar, Department of Mathematics, University of Houston, Houston, TX (Nov. 2016).
 - The 2nd Annual Meeting of SIAM Central States Section, Little Rock, AR (Sept. 2016).
 - SIAM Conference on Computational Science and Engineering, Atlanta, GA (Feb.–Mar. 2017).
 - SIAM annual meeting, Boston, MA (July 2016).
 - Scientific Computing Seminar, Department of Mathematics, University of Houston, Houston, TX (Mar. 2016).
 - SIAM Conference on Analysis of Partial Differential Equations, Scottsdale, AZ (Dec. 2015).
 - Mid Atlantic Numerical Analysis Day 2015. Temple University, Pennsylvania, PA (Nov. 2015).
 - Department of Mathematics, Michigan State University, East Lansing, MI (Apr. 2014).
 - Oak Ridge National Laboratory, Oak Ridge, TN (Jan, 2014).
 - SIAM Conference on Analysis of Partial Differential Equations, Orlando, FL (Dec. 2013).
 - SIAM Conference on Computational Science and Engineering, Boston, MA (Feb. - Mar. 2013).
 - Midwest Numerical Analysis Day 2012, Notre Dame, IN (May 2012).
 - Contributed Talk, ICIAM 2011, Vancouver, Canada (July 2011).
 - SIAM Conference on Computational Science and Engineering, Reno, NV (Mar. 2011).
- Posters:
 - Mid Atlantic Numerical Analysis Day 2017, Philadelphia, PA (Nov. 2017).
 - SIAM Conference on Computational Science and Engineering, Salt Lake City, Utah (Mar. 2015).

Teaching Experience

- Instructor: *Topics in Numerical Analysis I: Finite Difference Methods for Time-dependent Problems*, Texas Tech University, Fall 2019.

- Instructor: *Differential Equations II*, Texas Tech University, Fall 2019.
- Instructor: *Numerical Analysis II* (Graduate Preliminary Examination Sequence), Texas Tech University, Spring 2019.
- Instructor: *Numerical Analysis I* (Graduate Preliminary Examination Sequence), Texas Tech University, Fall 2018.
- Instructor: *Introduction to Numerical Analysis II*, Texas Tech University, Spring 2018.
- Instructor: *Mathematical Computing*, Texas Tech University, Fall 2017.
- Instructor: *Calculus I*, Michigan State University, Spring 2017.
- Instructor: *Calculus I*, Michigan State University, Fall 2016.
- Instructor: *Calculus I*, Michigan State University, Spring 2016.
- Instructor: *Calculus II*, Michigan State University, Fall 2015.
- Instructor: *Calculus I*, Michigan State University, Spring 2015.
- Instructor: *Calculus I*, Michigan State University, Fall 2014.

Professional Service

- Referee for Journal of Computational Physics (JCP), SIAM Journal on Scientific Computing (SISC), Journal of Scientific Computing (JSC), Journal of Computational Mathematics (JCM), Communication in Computational Physics (CiCP), ESAIM: Mathematical Modelling and Numerical Analysis (M^2AN), Boundary Value Problems (BVP), Geoscientific Model Development (GMD), Quarterly Journal of the Royal Meteorological Society (QJRMS), Computers & Fluids.