Xiangxiong Zhang

CONTACT
INFORMATION

Department of Mathematics
Purdue University
150 N. University Street
West Lafayette, IN 47907-2067

Email: zhan1966@purdue.edu
URL: www.math.purdue.edu/~zhan1966/

EMPLOYMENT

2020-
Associate Professor, Department of Mathematics,
2014-2020
Assistant Professor, Department of Mathematics,
Purdue University.

August 2011-July 2014
Postdoctoral Associate in Imaging and Computing Group, Mathematics Department,
Mentor: Laurent Demanet
Massachusetts Institute of Technology.

EDUCATION

Ph.D. in Mathematics, May 2011
Advisor: Chi-Wang Shu
Brown University

B. Sc. in Mathematics and Applied Mathematics, 2006
University of Science and Technology of China

RESEARCH
INTERESTS

Applied mathematics, numerical analysis and scientific computing including:
1. Numerical PDEs, especially high order accurate schemes
2. Optimization algorithms, especially nonsmooth convex optimization and Riemannian optimization

RESEARCH
IMPACTS

- 3800+ citations on Google Scholar.
- 2600+ citations on Elsevier Scopus database.
- 2400+ citations on Web of Science.
- 1700+ citations on American Math Society MathSciNet database.
- Most Cited *Journal of Computational Physics* Articles in the year 2015 since 2010: [2] and [3] in JOURNAL PUBLICATIONS.
- Most cited mathematicians by citations in MathSciNet in 2021: ranked 3rd among mathematicians who got their Ph.D. in 2011.
- World Top 2% Scientists in 2023: ranked 104th among 15,925 scientists in the subfield *Numerical & Computational Mathematics* by counting citations (self citations excluded) in the year 2022.

HONORS	- Plenary speaker, International Conference on Spectral and High Order Methods (ICOSAHOM) 2023.

- ACM Computing Reviews' Best of 2012, notable paper in computing: [6] in JOURNAL PUBLICATIONS.
- Silver prize of doctoral thesis, 2011 New World Mathematics Awards, awarded in the 6th International Congress of Chinese Mathematicians, Taipei, 2013.
- 2011 SIAM Student Paper Prize.

GRANTS

- 2024: Purdue Seed Funding for high-profile journal review papers, books and monographs.
- 2023-2024: National Science Foundation, AGEP-GRS supplement to DMS-2208515, $62,868.
- 2022-2025: National Science Foundation DMS-2208518, *Efficient Neural Network Based Numerical Schemes for Hyperbolic Conservation Laws*. $271,606.
- 2019-2022: National Science Foundation DMS-1913120, *Novel High Order Accurate Finite Difference Schemes Constructed via Superconvergence of Finite Element Methods*. $175,000 (with no cost extension to 2023).
- 2020: PRF Summer Faculty Grant.
- 2019-2020: year long PRF grant (Cagiantas Fellowship for Mr. Hao Li).
- 2018-2019: Simons Foundation Collaboration Grants for Mathematicians. $8,400.
- 2015-2018: National Science Foundation DMS-1522593, *Robust and Efficient High Order Methods for Time Dependent Problems*. $196,912 (with no cost extension to 2019).
- 2013-2015: AMS Simons Travel Grant. $4,000.

STUDENTS & POSTDOCS

Postdoc:
- Dr. Chen Liu, Golomb Visiting Assistant Professor, 2021-

Ph.D. students:
- Mr. Emmanuel Torres, Ph.D. student in mathematics, 2021-
- Mr. Shixin Zheng, Ph.D. student in mathematics, 2019-
- Dr. Hao Li, Ph.D. in mathematics, 2021. Thesis title: *Accuracy and monotonicity of spectral element method on structured meshes*. Placement after graduation: 2022-2023, Postdoctoral Fellow, Oden Institute, University of Texas at Austin. 2024-, Postdoctoral Fellow The Hong Kong Polytechnic University.

Advised graduate students for research:
- Ms. Ainshika, visiting Ph.D. student (Indian Institute of Technology (BHU) Varanasi, SERB Overseas Visiting Doctoral Fellowship), 2023-2024.
- (co-adviser) Mr. Xinyu Liu, Ph.D. student in math, 2019-
- (co-adviser) Mr. Sashank Srinivasan, master student in Aeronautics and Astronautics Engineering, 2016-2017.

Advised undergraduate students for research:
- Ms. Yinuo Zhao, 2024
- Mr. Dionysis Milesis, fall 2022, with one ongoing project.
- Mr. Yue Wu, summer 2022, with one working paper.

- Ms. Xinyang Chen, spring 2022.

- Ms. Bhakti Vyas, summer 2021, with one publication [36].

- Mr. Cody Ball, spring 2021.

- Ms. Chiara Travesset, summer and fall 2020.

- Mr. Naveen Vivek, summer 2020.

- Mr. Logan Cross (summer 2019, supported by SURF program; fall 2019; spring and summer 2020), with one publication [39] and a preprint [42].

- Ms. HyeJin Kim (summer 2018, supported by Joel Spira Undergraduate Summer Research Award).

- Mr. Jarrod Burgh (summer 2018).

- Mr. Keith Yuan Patarroyo Tovar, undergrad from Universidad Nacional de Colombia, UREP-C program in the Colombia Purdue Initiative, June-Dec, 2017.

- Mr. Varun Vasudevan Nair, fall semester, 2017.

Undergraduate student mentoring:
- Mr. Brijesh Patel, Applied Math, Emerging Leaders Science Scholars, 2022-

- Mr. Xiaoyu Liu, Mathematics and Physics, 2021-

    Joel Spira Undergraduate Summer Research Award, 2023.

Graduate student mentoring:
- Mr. Nicholas Dominic Gismondi, Mathematics, 2021-2023

- Mr. Emmanuel Torres, Mathematics, 2021-2023

PREPRINTS

52. Z. Chen, J. Lu, Y. Lu and X. Zhang, Fully discretized Sobolev gradient flow for the Gross-Pitaevskii eigenvalue problem, https://arxiv.org/abs/2403.06028

51. C. Liu and X. Zhang, An optimization based limiter for enforcing positivity in a semi-implicit discontinuous Galerkin scheme for compressible Navier–Stokes equations. https://arxiv.org/abs/2402.15645

50. X. Zhang, Recent Progress on Qk Spectral Element Method: Accuracy, Monotonicity and Applications, submitted to ICOSAHOM 2023 Conference Proceedings.

49. Y. Chen, D. Xiu and X. Zhang, On enforcing non-negativity in polynomial approximations in high dimensions.

48. H. Li and X. Zhang, A monotone Q^1 finite element method for anisotropic elliptic equations, submitted to the special issue in honor of Chi-Wang Shu's 65th birthday for the *Beijing Journal of Pure and Applied Mathematics*.

47. X. Liu, J. Shen and X. Zhang, A simple GPU implementation of spectral-element methods for solving 3D Poisson type equations on cartesian meshes. arXiv:2310.00226

46. T. Yu, S. Zheng, J. Lu, G. Menon and X. Zhang, Riemannian Langevin Monte Carlo schemes for sampling PSD matrices with fixed rank.
https://arxiv.org/abs/2309.04072

45. S. Zheng, H. Yang, and X. Zhang, On the convergence of orthogonalization-free conjugate gradient method for extreme eigenvalues of Hermitian matrices: a Riemannian optimization interpretation, https://arxiv.org/abs/2302.04974, submitted to *Journal of Computational and Applied Mathematics*.

44. S. Zheng, W. Huang, B. Vandereycken and X. Zhang, Riemannian optimization using three different metrics for Hermitian PSD fixed-rank constraints: an extended version. arXiv:2204.07830

JOURNAL
PUBLICATIONS

43. L. Cross and X. Zhang, On the monotonicity of Q3 spectral element method for Laplacian, to appear on *Annals of Applied Mathematics*. arXiv:2010.07282

42. C. Liu, B. Riviere, J. Shen and X. Zhang, A simple and efficient convex optimization based bound-preserving high order accurate limiter for Cahn–Hilliard–Navier–Stokes system, to appear on *SIAM Journal on Scientific Computing*. https://arxiv.org/abs/2307.09726

41. M. Dai, M. Hoeller, Q. Peng, and X. Zhang, Kolmogorov's dissipation number and determining wavenumber for dyadic models. Nonlinearity 37, no. 2 (2024): 025015.

40. Z. Chen, J. Lu, Y. Lu and X. Zhang On the convergence of Sobolev gradient flow for the Gross-Pitaevskii eigenvalue problem, *SIAM Journal on Numerical Analysis* 62 (2024), pp. 667–691.

39. L. Cross and X. Zhang, On the monotonicity of Q2 spectral element method for Laplacian on quasi-uniform rectangular meshes, *Communications in Computational Physics* Vol. 35, No. 1, pp. 160-180, 2024.

38. C. Liu, Y. Gao and X. Zhang, Structure preserving schemes for Fokker-Planck equations of irreversible processes, *Journal of Scientific Computing* 98(1):4, 2024.

37. C. Liu and X. Zhang, A positivity-preserving implicit-explicit scheme with high order polynomial basis for compressible Navier–Stokes equations, *Journal of Computational Physics* 493:112496, 2023.

36. M. Dai, B. Vyas and X. Zhang, 1D Model for the 3D Magnetohydrodynamics, *Journal of Nonlinear Science* (2023) 33:87. DOI.

35. X. Liu, J. Shen and X. Zhang, An efficient and robust SAV based algorithm for discrete gradient systems arising from optimizations. *SIAM Journal on Scientific Computing*, Vol. 45, No. 5, pp. A2304–A2324, 2023.

34. B. Ren, Z. Gao, Y. Gu, S. Xie and X. Zhang, A positivity-preserving and well-balanced high order compact finite difference scheme for shallow water equations, *Communications in Computational Physics*, 35 (2024), pp. 524-552.

33. H. Li and X. Zhang, A high order accurate bound-preserving compact finite difference scheme for two-dimensional incompressible flow, *Communications on Applied Mathematics and Computation*, Volume 6, pages 113–141, (2024). Focused Issue in Memory of Prof. Ching-Shan Chou.

32. C. Fan, X. Zhang and J. Qiu, Positivity-preserving high order finite difference WENO schemes for the compressible Navier-Stokes equations, *Journal of Computational Physics* 467 (2022): 111446.

31. J. Hu and X. Zhang, Positivity-preserving and energy-dissipative finite difference schemes for the Fokker-Planck and Keller-Segel equations, *IMA Journal of Numerical Analysis*, 43 (2022), pp. 1450–1484.

30. J. Shen and X. Zhang, Discrete Maximum principle of a high order finite difference scheme for a generalized Allen-Cahn equation, *Communications in Mathematical Sciences* 20(5), pp.1409-1436.

29. H. Li, D. Appelö and X. Zhang, Accuracy of spectral element method for wave, parabolic and Schrödinger equations, *SIAM Journal on Numerical Analysis* 60(1): 339–363, 2022.

28. C. Fan, X. Zhang and J. Qiu, A positivity-preserving hybrid Hermite WENO scheme for the compressible Navier-Stokes equations, *Journal of Computational Physics* Volume 445, 2021, 110596.

27. M. Li, Y. Cheng, J. Shen and X. Zhang, A Bound-Preserving High Order Scheme for Variable Density Incompressible Navier-Stokes Equations, *Journal of Computational Physics* 425 (2021): 109906.

26. H. Li and X. Zhang, On the monotonicity and discrete maximum principle of the finite difference implementation of C^0-Q^2 finite element method, *Numerische Mathematik*, 145, 437-472 (2020).

25. H. Li and X. Zhang, Superconvergence of high order finite difference schemes based on variational formulation for elliptic equations, *Journal of Scientific Computing* 82, 36 (2020).

24. H. Li and X. Zhang, Superconvergence of C^0-Q^k finite element method for elliptic equations with approximated coefficients, *Journal of Scientific Computing* 2, 1 (2020).

23. H. Li, S. Xie and X. Zhang, A high order accurate bound-preserving compact finite difference scheme for scalar convection diffusion equations, *SIAM Journal on Numerical Analysis*, 2018, 56(6), 3308-3345.

22. S. Srinivasan, J. Poggie and X. Zhang, A positivity-preserving high order discontinuous Galerkin scheme for convection-diffusion equations, *Journal of Computational Physics*, Volume 366 (2018), Pages 120-143.

21. J. Hu, R. Shu and X. Zhang, Asymptotic-preserving and positivity-preserving implicit-explicit schemes for the stiff BGK equation, *SIAM Journal on Numerical Analysis*, 2018, Vol.56(2), 942-973.

20. J. Hu and X. Zhang, On a class of implicit-explicit Runge Kutta schemes for stiff kinetic equations preserving the Navier-Stokes limit, *Journal of Scientific Computing*, (2017) 73: 797-818.

19. W. Huang, K. Gallivan and X. Zhang, Solving PhaseLift by low-rank Riemannian optimization methods for complex semidefinite constraints, *SIAM Journal on Scientific Computing*, 39-5 (2017), pp. B840-B859.

18. X. Zhang, On positivity preserving high order discontinuous Galerkin schemes for compressible Navier-Stokes equations, *Journal of Computational Physics*, 328 (2017): 301-343.

17. X. Zhang, A curved boundary treatment for discontinuous Galerkin schemes solving time dependent problems, *Journal of Computational Physics*, 308 (2016): 153-170.

16. X. Cai, X. Zhang and J. Qiu, Positivity-preserving high order finite volume HWENO schemes for compressible Euler equations, *Journal of Scientific Computing*, (2016) 68: 464.

15. X. Zhang and S. Tan, A simple and accurate discontinuous Galerkin scheme for modeling scalar-wave propagation in media with curved interfaces, *Geophysics*, Vol. 80, No. 2, pp. T83-T89.

14. L. Demanet and X. Zhang, Eventual linear convergence of the Douglas-Rachford iteration for basis pursuit, *Mathematics of Computation* 85 (2016), 209-238.

13. Y. Xing and X. Zhang, Positivity-preserving well-balanced discontinuous Galerkin methods for the shallow water equations on unstructured triangular meshes, *Journal of Scientific Computing*, v57 (2013), pp. 19-41.

12. Y. Zhang, X. Zhang and C.-W. Shu, Maximum-principle-satisfying second order discontinuous Galerkin schemes for convection-diffusion equations on triangular meshes, *Journal of Computational Physics*, v234 (2013), pp. 295-316.

11. X. Zhang and C.-W. Shu, A minimum entropy principle of high order schemes for gas dynamics equations, *Numerische Mathematik*, (2012) 121:545-563.

10. X. Zhang and C.-W. Shu, Positivity-preserving high order finite difference WENO schemes for compressible Euler equations, *Journal of Computational Physics*, v231 (2012), pp.2245-2258.

9. X. Zhang, Y.-Y. Liu and C.-W. Shu, Maximum-principle-satisfying high order finite volume WENO schemes for convection-diffusion equations, *SIAM Journal on Scientific Computing*, v34 (2012), pp. A627-A658.

8. C. Wang, X. Zhang, C.-W. Shu and J. Ning, Robust high order discontinuous Galerkin schemes for two-dimensional gaseous detonations,*Journal of Computational Physics*, v231 (2012), pp.653-665.

7. X. Zhang and C.-W. Shu, Maximum-principle-satisfying and positivity-preserving high order schemes for conservation laws: survey and new developments, *Proceedings of the Royal Society A*, v467 (2011), pp.2752-2776.

6. X. Zhang, Y. Xia and C.-W. Shu, Maximum-principle-satisfying and positivity-preserving high order discontinuous Galerkin schemes for conservation laws on triangular meshes, *Journal of Scientific Computing*, v50 (2012), pp.29-62.

5. X. Zhang and C.-W. Shu, Positivity-preserving high order discontinuous Galerkin schemes for compressible Euler equations with source terms, *Journal of Computational Physics*, v230 (2011), pp.1238-1248.

4. Y. Xing, X. Zhang and C.-W. Shu, Positivity-preserving high order well-balanced discontinuous Galerkin methods for the shallow water equations, *Advances in Water Resources*, v33 (2010), pp.1476-1493.

3. X. Zhang and C.-W. Shu, On positivity preserving high order discontinuous Galerkin schemes for compressible Euler equations on rectangular meshes, *Journal of Computational Physics*, v229 (2010), pp.8918-8934.

2. X. Zhang and C.-W. Shu, On maximum-principle-satisfying high order schemes for scalar conservation laws, *Journal of Computational Physics*, v229 (2010), pp. 3091-3120.

1. X. Zhang and C.-W. Shu, A genuinely high order total variation diminishing scheme for one-dimensional scalar conservation laws, *SIAM Journal on Numerical Analysis*, Volume 48, Issue 2 (2010), pp. 772-795.

PUBLICATIONS IN REFEREED BOOK CHAPTERS

1. Zhengfu Xu and Xiangxiong Zhang, *Bound-preserving high order schemes for conservation laws*, Volume 18, *Handbook of Numerical Methods for Hyperbolic Problems: Applied and Modern Issues*, R. Abgrall and C.-W. Shu, Editors, North-Holland, Elsevier, Amsterdam, 2017, pp. 81-102.

CONFERENCE PROCEEDINGS

1. M. Leinonen, R. J. Hewett, X. Zhang, L. Ying, L. Demanet, Higher-dimensional wave atoms and compression of seismic datasets, in Proc. SEG annual meeting, Houston, September 2013.

2. X. Zhang and S. Tan, A simple and accurate discontinuous Galerkin scheme for modeling scalar-wave propagation in media with curved interfaces, in Proc. SEG annual meeting, Denver, October 2014.

3. Wen Huang, Kyle A. Gallivan and Xiangxiong Zhang, Solving PhaseLift by Low-rank Riemannian Optimization Methods, INTERNATIONAL CONFERENCE ON COMPUTATIONAL SCIENCE (ICCS), San Diego, CA, 2016.

TALKS &
PRESENTATIONS

- Invited talk, workshop on *Spectral Analysis of Schrödinger Operators*, ICERM, Providence, August 2024.

- Invited minisymposium talk, *Modeling and Optimization: Theory and Applications (MOPTA)* Conference, Lehigh University, August 2024.

- Minisymposium talk, minisymposium *Geometric Methods for Matrix Spaces*, SIAM Conference on Applied Linear Algebra, Paris, May 2024.

- Minisymposium talk, Midwest Numerical Analysis Day, Department of Mathematics, The University of Iowa, April 13-14, 2024.

- Probability Seminar, Purdue University, April 10, 2024
  Talk title: *Brownian Motion, mean curvature, Langevin equations and Monte Carlo schemes on matrix manifolds.*

- Minisymposium talk, 7th Chilean Workshop on Numerical Analysis of Partial Differential Equations (WONAPDE 2024), University of Concepcion, Chile, Jan 2024.

- Invited talk, *Opening Workshop on Recent Advances in Numerical Methods for Hyperbolic Conservation Laws*, Shenzhen International Center of Mathematics at Southern University of Science and Technology, Shenzhen, China, December, 2023.

- Seminar talk, Department of Applied Mathematics, The Hong Kong Polytechnic University, December, 2023.

- Seminar talk, Department of Mathematics, Hong Kong University of Science and Technology, December, 2023.

- Talk at Conference on Fast Direct Solvers, CCAM, Purdue University, November, 2023.
  Talk title: *A Simple GPU Implementation of Spectral-Element Methods for 3D Poisson Type Equations in MATLAB 2023.*

- Invited talk at workshop *New Trends in Kinetic and Optimal Transport*, School of Mathematics, University of Minnesota, October, 2023.

- Seminar of Mathematical Sciences, Michigan Tech University, October, 2023.

- Numerical Analysis Seminar, University of Maryland, College Park, October, 2023.

- CCAM seminar talk, Purdue University, September, 2023.
  Talk title: *An efficient nonsmooth global optimization-based bound-preserving approach for time-dependent problems.*

- Minisymposium talk, International Congress on Industrial and Applied Mathematics (ICIAM 2023), Tokyo, Japan, August, 2023.

- **Plenary talk**, International Conference on Spectral and High Order Methods (ICOSAHOM), Seoul, Korea, August 2023.

- **Invited 45 minutes lecture** (postponed/cancelled due to pandemic restrictions), the 9th International Congress of Chinese Mathematicians (ICCM2022), Beijing, China June 27 to July 2, 2022.

- Minisymposium talk, USNCCM 17 (US National Congress on Computational Mechanics), Albuquerque, New Mexico, July 2023.

- *Lefschetz Center for Dynamical Systems* Seminar, Division of Applied Math, Brown University, February and May 2023.

- Scientific Computing Seminar, Division of Applied Math, Brown University, February 2023.

- Numerical Analysis and Scientific Computing Seminar, the University of Waterloo, virtual, November 2022.

- Numerical Analysis & PDE Seminar, University of Delaware, Oct, 2022.

- Applied Math Seminar, Duke University, Oct, 2022.

- Applied Math Seminar, Texas Tech University, virtual, September 2022.

- Chinese Academy of Science, virtual talk, August, 2022.

- Southern University of Science and Technology, virtual CAM lectures, July, 2022.

- Seminar on Applied Mathematics, Hong Kong University of Science and Technology, virtual, April 26, 2022

- Poster Presentation, New trends in scientific computing, IPAM, UCLA, April 20-22 2022.

- Departmental Colloquium talk, Old Dominion University, virtual, April 21, 2022.

- Applied and Computational Mathematics and Statistics, Seminar talk, Notre Dame University, March 17, 2022.

- Applied and Computational Mathematics Seminar, University of Wisconsin Madison, March 4, 2022.

- Invited talk, International Workshop on Physical Property-Preserving Numerical Methods for PDEs, Nov 13 - 14, 2021, Virtual, Ocean University of China

- Mini-symposium talk, International Conference on Spectral and High Order Methods (ICOSAHOM), Virtual, July 2021.

- Seminar talk, Virtual, Ocean University of China, Virtual, April 2021.

- CCAM seminar, Purdue University, Virtual, April 2021.
  Talk title: *Recent Progress on Q^k Spectral Element Method: Accuracy, Monotonicity and Applications.*

- Mini-symposium talk, SIAM CSE conference, Virtual, March 2, 2021.

- Data science seminar, Purdue University, November, 2020

- Invited talk, workshop on high order WENO methods, Xiamen University, Virtual, November, 2020

- One hour lecture on high order numerical methods, University of Science and Technology of China, Virtual, August, 2020

- Numerical analysis seminar, University of Colorado Boulder, Octobor 2019.

- Invited talk, Second Conference on Scientific and Engineering Computing for Young Chinese Scientists, Beijing, August, 2019

- Invited talk, 11th International Conference on Scientific Computing and Applications, Xiamen, China, May 2019

- TDS (SciDAC) Webinar, Los Alamos National Laboratory, May 2019.

- SIAM CSE conference, Spokane, Washington, February 25 - March 1, 2019.

- *High Order Structure-Preserving Numerical Methods: Algorithm, Analysis, and Applications*, Workshop at Tsinghua Sanya International Mathematics Forum, Sanya, China, Jan 2019.

- Numerical Analysis Seminar, Texas A & M, September 26, 2018

- SIAM Great Lakes Section Annual Meeting, Wayne State University April, 2018.
- Numerical Analysis Seminar, University of Maryland, College Park, April 2018.
- Workshop *Recent advances and applications in discontinuous Galerkin methods*, Harbin, China, July 2017.
- SIAM CSE Conference, Atlanta, Georgia, February, 2017.
- Institute of Mathematical Sciences Colloquim, Renmin University of China, Dec 2016
- The Third International Workshop on Development and Application of High-Order Numerical Methods, Hefei, China, Dec 2016.
- School of Mathematical Sciences Seminar, Ocean University of China, Dec 2016.
- International Conference on Spectral and High Order Methods (ICOSAHOM), Rio de Janerio, Brazil, June 2016
- 10th International Conference on Scientific Computing and Applications, Toronto, CA, June 2016
- Applied Mathematics Seminar, UC Berkeley, April 2016
- Applied Mathematics Seminar, Michigan State University, April 2016
- Mathematical Sciences Colloquium, Rensselaer Polytechnic Institute, October 2015.
- ACMS Colloquium, University of Notre Dame, September 2015.
- International Council for Industrial and Applied Mathematics, Beijing, China, August 2015.
- The International Workshop on Moving Mesh and High Order Numerical Methods, Xiamen, China, August 2015.
- National Center for Mathematics and Interdisciplinary Sciences Seminar, University of Science and Technology of China, Hefei, August 2015.
- SIAM Conference on Mathematical and Computational Issues in the Geosciences, Stanford, CA, June, 2015.
- BIRS Workshop *Higher Order Numerical Methods for Evolutionary PDEs: Applied Mathematics Meets Astrophysical Applications*, Banff, Canana, May 2015.
- CAM Seminar, Iowa State University, May, 2015.
- SIAM Central States Section Conference, Rolla, Missouri, April, 2015.
- SIAM CSE Conference, Salt Lake City, Utah, March, 2015.
- 2014 SEG Annual Meeting, Denver, CO, October, 2014.
- DG mini-symposium, The 6th European Conference on Computational Fluid Dynamics (ECFD VI), together with the 11th World Congress on Computational Mechanics (WCCM XI), Barcelona, Spain, July 2014.
- Mathematics Colloquium, Florida State University, Jan 2014.
- Mathematics Colloquium, Syracuse University, Jan 2014.
- Mathematics Colloquium, University of Southern California, Jan 2014.
- Mathematics Colloquium, Purdue University, Jan 2014.
- AMS-SIAM Special Session on Mathematics of Computation, Joint Mathematics Meetings in Baltimore, January 2014.
- Mathematics Colloquium, UT Dallas, Dec 2013.
- Scientific Computing and Numerics Seminar, Cornell University, Dec 2013.

- Scientific Computing Seminar, Umass Dartmouth, Dec 2013.
- Mini-symposium on "Recent Developments in Numerical Methods for PDEs", SIAM annual meeting, San Diego, July 2013.
- SIAM annual meeting, Minneapolis, Minnesota, July 2012.
- Mathematics Colloquium, The University of Iowa, Jan 2011.
- Discontinuous Galerkin Methods, 11th U.S. National Congress on Computational Mechanics, Minnesota, July 2011.
- MS Advances in High Order Numerical Methods for PDEs in Computational Mathematics, 7th International Congress on Industrial and Applied Mathematics (ICIAM 2011), Vancouver, Canada, July 2011.
- Seminar talk, Mathematics Department, MIT, Jan 2011.
- AMS-SIAM Special Session on Mathematics of Computation, Joint Mathematics Meetings in New Orleans, January 2011.

TEACHING EXPERIENCE

Purdue University
Primary Instructor
- MA/CS 615 Numerical PDE, Spring 2017/2019/2020/2022/2024.
- MA 598 Topics on optimization, Spring 2023
- MA 341 Foundations of Analysis, Fall 2018, Fall 2022
- MA 351 Elementary Linear Algebra, Fall 2021, Fall 2023.
- MA 353 Linear Algebra II, Spring 2021
- MA 362 Topics in Vector Caculus, Fall 2017, Spring 2019, Spring 2020,
- MA 304 Differential Equations And Analysis Of Nonlinear Systems For Engineering And The Sciences, Spring 2018
- MA 303 ODE and PDE for Engineering and the Sciences, Fall 2016
- MA 511 Linear Algebra With Applications, Spring 2016
- MA 265 Linear Algebra, Fall 2014

MIT
Primary Instructor
- MA 18.086 Computational Science and Engineering II, Spring 2014.

Brown University
Primary Instructor
- Math 0520 *Linear Algebra*, Spring 2010
- Math 0200 *Multivariable Calculus (Physics/Engineering)*, Fall 2009, Fall 2010
- Math 0100 *Single Variable Calculus II*, Spring 2009
- Math 0180 *Multivariable Calculus*, Fall 2008

ON-CAMPUS SERVICE	Thesis/defense committees of Ph.D. students: - Ms. Brooke E Hejnal, Mathematics, 2024 - Dr./Mr. Qiyuan Pang, Mathematics, 2023 - Dr./Mr. Shiheng Zhang, Mathematics, 2023 - Dr./Mr. Jiahao Zhang, Mathematics, 2022 - Dr./Mr. Senwei Liang, Mathematics, 2022 - Dr./Ms. Jingshuang Chen, Mathematics, 2021 - Dr./Mr. Yiqi Gu, Mathematics, 2019 - Dr./Ms. Tian Jing, School of Nuclear Engineering, 2018

Thesis/defense committees of Master students:
- Ms. Lei Qin, Earth, Atmospheric and Planetary Sciences, 2015
- Mr. Sashank Srinivasan, Aeronautics and Astronautics Engineering, 2017

Preliminary Exam or Advisory committees of Ph.D. students:
- Mr. Gareth Hardwick, Mathematics, 2024
- Mr. Cesar Andres Herrera Garro, Mathematics, 2024
- Ms. Anastassia Doktorova, Mathematics, 2023
- Ms. Tong Ding, Mathematics, 2022
- Ms. Brooke Hejnal, Mathematics, 2021
- Mr. Shiheng Zhang, Mathematics, 2021
- Mr. Senwei Liang, Mathematics, 2021
- Ms. Jingshuang Chen, Mathematics, 2018
- Mr. Jiahao Zhang, Mathematics, 2018

Department of Mathematics Committee Service:
- Applied Math Committee, 2021-2024
- Personnel Committee: 2021-2023
- Chair of Computer Committee: 2021-2024
- Computer Committee: 2016-2020

Organizer of Center for Computational & Applied Mathematics Seminar: 2021-2022

PROFESSIONAL SERVICE	Referee for high school competitions: Hang Lung Mathematics Awards for mathematical research: 2022, 2023.

Co-organizer of workshops and conference mini-symposiums:
with Chi-Wang Shu, *Recent advances of novel high order accurate methods for conservation laws*, International Conference on Spectral and High Order Methods, Seoul, Korea, August 14-18, 2023.

with Zhiqiang Cai and Jie Shen, *CCAM workshop: New trends in numerical methods for hyperbolic conservation laws*, Purdue University, May 9-10, 2022

with Zheng Sun, *Special Session on Recent Developments in High Order Numerical Methods for Partial Differential Equations*, AMS spring central sectional meeting at Purdue University, April, 2022.

with Chen Liu, *Special Session on Recent Progress of Efficient and Robust Schemes for Compressible Navier-Stokes Equations*, AMS spring central sectional meeting at Purdue University, April, 2022.

with Jean-Luc Guermond, *Structure preserving techniques for hyperbolic systems*, SIAM CSE conference, Spokane, Washington, February 25 - March 1, 2019.

with Y. Xing *Recent advances in structure preserving numerical methods for partial differential equations*, International Conference on Spectral and High Order Methods, London, UK, July 2018.

with B. Popov and J.-L. Guermond, *Positivity preserving and invariant domain preserving methods*, SIAM Conference on Computational Science and Engineering, Atlanta, Georgia, 2017

with Y. Cheng, *New advances in Discontinuous Galerkin methods*, International Conference on Spectral and High Order Methods, Rio de Janerio, Brazil, June 2016

with Y. Xing, *Discontinuous Galerkin finite element methods for partial differential equations and their applications*, 10th International Conference on Scientific Computing and Applications, Toronto, CA, June 2016

Referee for research proposals:
Simons Foundation Collaboration Grants, 2019.

Swiss National Science Foundation, 2014, 2017, 2021, 2023

Computational Mathematics, DMS, *National Science Foundation*, 2016

Research Grants Council of Hong Kong, 2014

Referee for journals/proceedings:
Advances in Applied Mathematics and Mechanics

Advances in Water Resources

Applied Mathematics and Computation

Applied Mathematics Letters

Applied Numerical Mathematics

Beijing Journal of Pure and Applied Mathematics

Communications in Computational Physics

Communications in Mathematical Sciences

Communications in Mathematics and Statistics

Communications on Applied Mathematics and Computation

Computers and Fluids

Computers and Mathematics with Applications

Computer Methods in Applied Mechanics and Engineering

Computer Physics Communications

Discrete and Continuous Dynamical System - B

Engineering Computations

ESAIM: Mathematical Modelling and Numerical Analysis (M2AN)

IEEE Transactions on Signal Processing

International Journal for Numerical Methods in Engineering

International Journal for Numerical Methods in Fluids

International Journal of Numerical Analysis and Modeling

Journal of Applied Mathematics

Journal of Computational and Applied Mathematics

Journal of Computational Mathematics

Journal of Computational Physics

Journal of Fluid Mechanics

Journal of Scientific Computing

Kinetic and Related Models

Mathematics and Computers in Simulation

Methods and Applications of Analysis

Mathematical Programming

Mathematics of Computation

Numerical Methods for Partial Differential Equations

Numerische Mathematik

Research in the Mathematical Sciences

Results in Applied Mathematics

SCIENCE CHINA Mathematics

SIAM Review

SIAM Journal on Matrix Analysis and Applications

SIAM Journal on Numerical Analysis

SIAM Journal on Optimization

SIAM Journal on Scientific Computing

Studies in Applied Mathematics