

CURRICULUM VITAE

Jie Du

Education History

- **Ph.D. in Mathematics**, September 2010 – June 2015,
School of Mathematical Sciences, University of Science and Technology of China.
Advisor: Mengping Zhang and Chi-Wang Shu
- **Visiting Ph.D. Student**, August 2014 – May 2015,
Division of Applied Mathematics, Brown University.
Advisor: Chi-Wang Shu
- **B.S. in Mathematics**, September 2006 – July 2010,
School of Mathematics, HeFei University of Technology.

Employment History

- **Research Fellow**, November 2023– Present,
School of Mathematical Sciences, East China Normal University.
- **Assistant Professor**, September 2017– November 2023,
Yau Mathematical Sciences Center, Tsinghua University.
- **Adjunct Assistant Professor**, June 2021 – May 2023,
Yanqi Lake Beijing Institute of Mathematical Sciences and Applications.
- **Postdoctoral Fellow**, August 2015 – August 2017,
Department of Mathematics, The Chinese University of Hong Kong.
Mentor: Eric T. Chung
- **Research Assistant**, July 2014 – August 2014,
Department of Civil Engineering, The University of Hong Kong.
Mentor: S.C. Wong
- **Research Assistant**, July 2012 – January 2013,
Department of Civil Engineering, The University of Hong Kong.
Mentor: S.C. Wong
- **Research Assistant**, July 2011 – January 2012,
Department of Civil Engineering, The University of Hong Kong.
Mentor: S.C. Wong

Research Interests

- High-order numerical methods for partial differential equations.
- Modeling and numerical simulations for traffic flow problems.
- Computational fluid dynamics.

List of Publications

1. H. Liang, L. Yang, J. Du, S.C. Wong, and C.-W. Shu, *Modeling crowd pressure and turbulence through a mixed-type continuum model for multidirectional pedestrian flow*, *Transportmetrica B: Transport Dynamics*, v12 (2024), article number 2328774.
2. J. Du, Y. Yang, and F. Zhu, *Well-balanced positivity-preserving discontinuous Galerkin methods for Euler equations with gravitation*, *Journal of Computational Physics*, v505 (2024), article number 112877.
3. C. Wu, L. Yang, J. Du, X. Pei, and S.C. Wong, *Continuum dynamic traffic models with novel local route-choice strategies for urban cities*, *Transportation Research Part B*, v181 (2024), article number 102888.
4. L. Yang, H. Liang, J. Du, and S.C. Wong, *Positivity-Preserving Discontinuous Galerkin Methods on Triangular Meshes for Macroscopic Pedestrian Flow Model*, *Journal of Advanced Transportation*, v2023 (2023), article ID 7245723.
5. J. Du, Y. Liu, and Y. Yang, *An oscillation-free bound-preserving discontinuous Galerkin method for multi-component chemically reacting flows*, *Journal of Scientific Computing*, v95 (2023), article number 90.
6. J. Du and Y. Yang, *High-order bound-preserving finite difference methods for multispecies and multireaction detonations*, *Communications on Applied Mathematics and Computation*, v5 (2023), pp.31-63. Special issue on WENO methods.
7. T. Fan, S.C. Wong, Z. Zhang, and J. Du, *A dynamically bi-orthogonal solution method for a stochastic Lighthill-Whitham-Richards traffic flow model*, *Computer-Aided Civil and Infrastructure Engineering*, v38 (2023), pp.1447-1461.
8. L. Yang, C.-W. Shu, S.C. Wong, M. Zhang, and J. Du, *On the existence and uniqueness properties of the Hoogendoorn-Bovy pedestrian flow model*, *Transportmetrica B: Transport Dynamics*, v11 (2023), pp.912-937.
9. J. Du and Y. Yang, *High-order bound-preserving discontinuous Galerkin methods for multicomponent chemically reacting flows*, *Journal of Computational Physics*, v469 (2022), 111548.
10. J. Du, C.-W. Shu, and X. Zhong, *An improved simple WENO limiter for discontinuous Galerkin methods solving hyperbolic systems on unstructured meshes*, *Journal of Computational Physics*, v467 (2022), 111424.
11. J. Du, E.T. Chung, and Y. Yang, *Maximum-principle-preserving local discontinuous Galerkin methods for Allen-Cahn equations*, *Communications on Applied Mathematics and Computation*, v4 (2022), pp.353-379. Special issue on discontinuous Galerkin methods.
12. H. Liang, J. Du, and S.C. Wong, *A continuum model for pedestrian flow with explicit consideration of crowd force and panic effects*, *Transportation Research Part B*, v149 (2021), pp.100-117.
13. J. Du and E.T. Chung, *Mortar DG method with staggered hybridization for Rayleigh waves simulation*, *Communications in Computational Physics*, v29 (2021), pp.111-127.

14. J. Du and Y. Yang, *Third-order conservative sign-preserving and steady-state-preserving time integrations and applications in stiff multispecies and multireaction detonations*, Journal of Computational Physics, v395 (2019), pp.489-510.
15. J. Du, C. Wang, C. Qian, and Y. Yang, *High-order bound-preserving discontinuous Galerkin methods for stiff multispecies detonation*, SIAM Journal on Scientific Computing, v41 (2019), pp.B250-B273.
16. J. Du and Y. Yang, *Maximum-principle-preserving third-order local discontinuous Galerkin method for convection-diffusion equations on overlapping meshes*, Journal of Computational Physics, v377 (2019), pp.117-141.
17. J. Du, Y. Yang, and E.T. Chung, *Stability analysis and error estimates of local discontinuous Galerkin methods for convection-diffusion equations on overlapping meshes*, BIT Numerical Mathematics, v59 (2019), pp.853-876.
18. J. Du, E.T. Chung, M. F. Lam, and X.-P. Wang, *Discontinuous Galerkin method with staggered hybridization for a class of nonlinear Stokes equations*, Journal of Scientific Computing, v76 (2018), pp.1547-1577.
19. J. Du and E.T. Chung, *An adaptive staggered discontinuous Galerkin method for the steady state convection-diffusion equation*, Journal of Scientific Computing, v77 (2018), pp.1490-1518.
20. J. Du and C.-W. Shu, *Positivity-preserving high-order schemes for conservation laws on arbitrarily distributed point clouds with a simple WENO limiter*, International Journal of Numerical Analysis and Modeling, v15 (2018), pp.1-25.
21. E.T. Chung, J. Du, and C.Y. Lam, *Discontinuous Galerkin methods with staggered hybridization for linear elastodynamics*, Computers & Mathematics with Applications, v74 (2017), pp.1198-1214.
22. J.C. Long, W.Y. Szeto, J. Du, and R.C.P. Wong, *A dynamic taxi traffic assignment model: a two-level continuum transportation system approach*, Transportation Research Part B, v100 (2017), pp.222-254.
23. E.T. Chung, J. Du, and M.C. Yuen, *An adaptive SDG method for the Stokes system*, Journal of Scientific Computing, v70 (2017), pp.766-792.
24. J. Du and C.-W. Shu, *A high order stable conservative method for solving hyperbolic conservation laws on arbitrarily distributed point clouds*, SIAM Journal on Scientific Computing, v38 (2016), pp.A3094-A3128.
25. J. Du, C.-W. Shu, and M. Zhang, *A simple weighted essentially non-oscillatory limiter for the correction procedure via reconstruction (CPR) framework on unstructured meshes*, Applied Numerical Mathematics, v90 (2015), pp.146-167.
26. J. Du, S.C. Wong, C.-W. Shu, and M. Zhang, *Reformulating the Hoogendoorn-Bovy predictive dynamic user-optimal model in continuum space with anisotropic condition*, Transportation Research Part B, v79 (2015), pp.189-217.

27. J. Du, C.-W. Shu, and M. Zhang, *A simple weighted essentially non-oscillatory limiter for the correction procedure via reconstruction (CPR) framework*, Applied Numerical Mathematics, v95 (2015), pp.173-198.
28. Y.Z. Tao, Y.Q. Jiang, J. Du, S.C. Wong, P. Zhang, Y.H. Xia, and K. Choi, *Dynamic system-optimal traffic assignment for a city using the continuum modeling approach*, Journal of Advanced Transportation, v48 (2014), pp.782-797.
29. J. Du, S.C. Wong, C.-W. Shu, T. Xiong, M. Zhang, and K. Choi, *Revisiting Jiang's dynamic continuum model for urban cities*, Transportation Research Part B, v56 (2013), pp.96-119.

List of Preprints

1. L. Yang, **J. Du**, S.C. Wong, and C.-W. Shu, *Boundedly rational continuum user equilibrium model for simultaneous departure time and route choice in traffic assignment problems*, submitted to Transportation Research Part B.

Research Grants

- 2021-2026: *Modeling and numerical computation of partial differential equations for aero-engine nacelle problems*. National Key R&D Program of China. Subprogram Principle Investigator.
- 2019-2021: *High Order Discontinuous Galerkin Methods on Point Clouds*. Youth Program of National Natural Science Foundation of China. Principle Investigator.
- 2023: Tsinghua University Initiative Scientific Research Program. Principle Investigator.
- 2022: Tsinghua University Initiative Scientific Research Program. Principle Investigator.
- 2019-2022: *Research on Mathematical Theory and Fast Algorithm for Waveform Based Earthquake Location*. General Program of National Natural Science Foundation of China. Participant.
- 2019-2021: *Unbalanced Optimal Transport: Theory and Application*. Tsinghua University Initiative Scientific Research Program. Participant.

Awards and Honors

- Paper Excellence Award, 2022, YMSC, Tsinghua University.
- Annual Excellence Award, 2021, YMSC, Tsinghua University.
- Research Excellence Award, 2020, YMSC, Tsinghua University.
- Paper Excellence Award, 2019, YMSC, Tsinghua University.
- The Dean's Excellence Award of Chinese Academy of Sciences.

- Qiu Shi Graduate Student Scholarship, 2014.
- Outstanding Graduates Award, 2010, HeFei University of Technology.
- Outstanding Thesis Award, 2010, HeFei University of Technology.
- National Scholarship, 2008 & 2009, HeFei University of Technology.
- Provincial-Level Merit Student, 2008, HeFei University of Technology.

Teaching

At East China Normal University (Instructor)

- *Numerical Methods for Differential Equations*. Spring 2024.

At Tsinghua University (Instructor)

- *Linear Algebra*. Fall 2017, Fall 2018, Fall 2019, Fall 2020, Fall 2021, Fall 2022.
Awarded as the “Excellent Course of Tsinghua University” in 2022.
- *Discontinuous Galerkin Methods*. Spring 2018, Spring 2020, Spring 2022, Spring 2023.
- *Numerical Methods for Partial Differential Equations*. Spring 2019.
- *Theory and Applications of Numerical Methods for Conservation Laws*. Fall 2019.

At The Chinese University of Hong Kong (Instructor)

- *Linear Algebra*. Summer 2016.

At University of Science and Technology of China (Teaching Assistant)

- *Numerical Methods for Partial Differential Equations*. Fall 2013.
- *Calculus*. Spring 2012.
- *Computational Methods*. Teaching Assistant. Spring 2011.

Post-doc and Student Mentorship

- Post-doc mentorship: Liangze Yang, September 2021–November 2023.
- Graduate student supervision: Chengyuan Wu, August 2019 –November 2023.
- Undergrad student mentorship: Zhengwen Zhou, 2020.
Thesis: High order WENO methods for a continuum model for pedestrian flows.
- Undergraduate Academic Advisors for the 2022-2023 academic year.

Workshop and Conference Organization

- Conference on High order numerical methods for PDEs in applied sciences, Sanya, China, January 29 - February 2, 2024.
- Minisymposium on High Order Numerical Methods for PDE Models in Applied Sciences, The Second HKSIAM Biennial Meeting, Hong Kong, China, August 28 - September 1, 2023.
- Minisymposium on Phase Transition and Control of PDE Models in Applied Sciences , The 10th International Congress on Industrial and Applied Mathematics, Tokyo, Japan, August 20-25, 2023.
- Applied and Computational Math Colloquium, Tsinghua University. Fall 2022.
- Tsinghua-BIMSA Computational & Applied Mathematics Seminar. Fall 2021. Spring 2022.
- Workshop on Efficient Numerical Algorithms and Data Dimensionality Reduction for Aero Engine Nacelle Models, Beijing, October 21, 2022.
- Workshop on High Order and High Performance Numerical Schemes for Scientific Computing, Beijing, December 7-8, 2019.
- Minisymposium on Finite Element and Discontinuous Galerkin Methods, The 4th Beijing-Tianjin-Hebei Conference on Computational Mathematics, Tianjin, August 24-27, 2019.
- Minisymposium on Analysis and Application of High Order Numerical Methods, The 12th China Society for Computational Mathematics (CSCM), Haerbin, July 31-August 4, 2019.
- Minisymposia on Recent Advances in High Order Methods for Time Dependent PDEs, The 9th International Congress on Industrial and Applied Mathematics (ICIAM), Valencia, Spain, July 15-19, 2019.
- The 6th ICCM CAM Conference on Geometry and Imaging, Organizing Committee, 2017.

Academic Activities

Invited Presentations

- Workshop on Development of High-Order Methods for Hyperbolic PDEs, Shenzhen, China, March 15-19, 2024.
- Workshop on New Advances in Efficient Algorithms for Hyperbolic Equations, Xiamen, China, January 12-14, 2024.
- 2023 Annual Academic Conference, Institute of Differential Equations and Computational Physics, Chinese Academy of Sciences, Beijing, December 2, 2023.
- Institute of Computational Mathematics and Scientific/Engineering Computing, Academy of Mathematics and Systems Science, CAS, Beijing, China, Nov. 25, 2023.

- Minisymposium, China Society for Industrial and Applied Mathematics (CSIAM) Annual Meeting 2023, Kunming, China, October 12-15, 2023.
- Sino-German Workshop on Advanced Numerical Methods for Hyperbolic Balance Laws, Beijing, Sep. 24-28, 2023.
- The Second HKSIAM Biennial Meeting, Hong Kong, China, August 28 - September 1, 2023.
- The 10th International Congress on Industrial and Applied Mathematics, Tokyo, Japan, August 20-25, 2023.
- The Fifth International Workshop on Development and Application of High-Order Numerical Methods, Qingdao, August 9-12, 2023.
- Minisymposium, The 13th China Society for Computational Mathematics (CSCM), Nanjing, July 15-19, Nanjing, China, 2023
- Zhejiang Normal University, June 22, 2023.
- Xiangtan University, June 20, 2023.
- Workshop on Modeling and Simulations for Complex System, Beijing Computational Science Research Center, March 25-26, 2023.
- Workshop on Computational Mathematics, Beijing University of Technology, March 18-19, 2023.
- Beijing Institute of Technology, February 24, 2023.
- Nanjing University of Posts and Telecommunications, Dec.12, 2022.
- Conference on Advances in Frontiers of Computational Science, BIMSA, Beijing, Oct. 29, 2022.
- Xiamen University, Oct. 13, 2022.
- Invited 45 minutes lecture. The 9th International Congress of Chinese Mathematicians (ICCM), Nanjing, China, July 31-August 5, 2022.
- College of Mathematics and System Science, Xinjiang University, April 20, 2022.
- GR Seminar, CAS, Feb. 17, 2022.
- CAM Seminar, CAS, Dec. 24, 2021.
- CAM Seminar, Southern University of Science and Technology, Dec. 11, 2021.
- Minisymposium on high order computational methods for fluid dynamics, China Society for Industrial and Applied Mathematics (CSIAM) Annual Meeting 2021, Hefei, China, October 7-10, 2021.
- Minisymposium on high order structure preserving numerical methods and applications, International Conference on Spectral and High Order Methods (ICOSAHOM), Vienna, Austria, July 12-16, 2021.

- Seminar at School of Mathematics, HeFei University of Technology, Hefei, China, November 23, 2019.
- Seminar at Beijing Computational Science Research Center, Beijing, China, October 10, 2019.
- Minisymposium on high order computational methods for fluid dynamics, China Society for Industrial and Applied Mathematics (CSIAM) Annual Meeting 2019, Foshan, China, September 19-22, 2019.
- Minisymposium on finite element and discontinuous Galerkin methods, The 4th Beijing-Tianjin-Hebei Conference on Computational Mathematics, Tianjin, China, August 24-27, 2019.
- Minisymposium on analysis and application of high order numerical methods, The 12th China Society for Computational Mathematics (CSCM), Haerbin, China, July 31-August 4, 2019.
- Minisymposia on recent advances in high order methods for time dependent PDEs, The 9th International Congress on Industrial and Applied Mathematics (ICIAM), Valencia, Spain, July 15-19, 2019.
- Seminar at School of Mathematical Sciences, University of Science and Technology of China, Hefei, China, July 1, 2019.
- The 11th International Conference on Scientific Computing and Applications (ICSCA), Xiamen, China, May 27-30, 2019.
- Workshop on DG Methods and Related Problems, Zhejiang University, Hangzhou, China, May 24-25, 2019.
- Seminar at School of Mathematical Sciences, Zhejiang University, Hangzhou, China, January 4, 2019.
- Workshop on Discontinuous Galerkin Methods, Hefei, China, November 22-24, 2018.
- Minisymposium on the many aspects of superconvergence and its importance in discontinuous Galerkin methods, International Conference on Spectral and High Order Methods (ICOSAHOM), London, United Kingdom, July 9-13, 2018.
- The Fourth International Workshop on the Development and Application of High-order Numerical Methods, Nanjing, China, May 31-June 4, 2018.
- College of Transportation Engineering, Tongji University, Shanghai, China, Jan. 07, 2018.
- Computational & Applied Mathematics Seminar, Tsinghua University, Beijing, Oct. 10, 2017.

- School of Mathematical Sciences, University of Science and Technology of China, Hefei, China, Jun. 8, 2017.
- The Hong Kong Mathematical Society Annual General Meeting 2017, Hong Kong University of Science and Technology, Hong Kong, May 20, 2017.
- Yau Mathematical Sciences Center, Tsinghua University, Beijing, China, Mar. 31, 2017.
- International Conference on Applied Mathematics 2016, Liu Bie Ju Centre for mathematical Sciences, City University of Hong Kong, Hong Kong, May 30-June 2, 2016.

Poster

- Advanced Numerical Methods in the Mathematical Sciences, Institute for Scientific Computation, Texas A&M University, College Station, TX, USA, May 4-8, 2015.
Poster: *A simple weighted essentially non-oscillatory (WENO) limiter for the correction procedure via reconstruction (CPR) framework on unstructured meshes.*
- The Third International Workshop on Development and Application of High-Order Numerical Methods: in honor of Professor Chi-Wang Shu on his 60th birthday, School of Mathematical Sciences, University of Science and Technology of China, Hefei, Anhui, China, Dec. 17-19, 2016.
Poster: *A high order stable conservative method for solving hyperbolic conservation laws on arbitrarily distributed point clouds.*

Participant

- The Summer Workshop on Numerical Methods of Multi-Media Hydrodynamics, Beijing Institute of Applied Physics and Computational Mathematics, Beijing, China, June 6-12, 2011.
- Computational Seismology Workshop, Tsinghua Sanya International Mathematics Forum, Sanya, Hainan, China, January 4-8, 2016.
- The 5th CAM-ICCM Workshop: Multiscale and Large-scale Scientific Computing, Department of Mathematics, The Chinese University of Hong Kong, Hong Kong, June 18-20, 2016.
- The Second International Workshop on Multimodal Transportation, Nanjing, China, June 23-24, 2018.
- The 16th SCIAM annual meeting, Chengdu, China, Sep. 13-16, 2018.

Referee for Journals

- Advances in Applied Mathematics and Mechanics
- Communications in Computational Physics
- Communications on Applied Mathematics and Computation

- CSIAM Transactions on Applied Mathematics
- International Journal of Sustainable Transportation
- Journal of Computational and Applied Mathematics
- Journal of Computational Physics
- Journal on Numerical Methods and Computer Applications
- Journal of Scientific Computing
- Transportmetrica B: Transport Dynamics

Computer Skills

- Programming languages: Fortran, Matlab, C.
- Experience in high performance scientific computing and in parallel computing using MPI.
- Software: working knowledge of standard business and mathematical software, including Matlab, Mathematica, Tecplot, \LaTeX , etc.