

# CURRICULUM VITAE

Jie Du

## Education History

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

## Employment History

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

## List of Publications

1. 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, to appear.
2. 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.

3. J. Du and Y. Yang, *High-order bound-preserving discontinuous Galerkin methods for multicomponent chemically reacting flows*, Journal of Computational Physics, v469 (2022), 111548.
4. 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.
5. 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.
6. J. Du and Y. Yang, *High-order bound-preserving finite difference methods for multispecies and multireaction detonations*, Communications on Applied Mathematics and Computation, 2021. Special issue on WENO methods.
7. 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.
8. 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.
9. 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.
10. 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.
11. 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.
12. 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.
13. 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.
14. J. Du, 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.
15. J. Du, 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.

16. 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.
17. 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.
18. 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.
19. 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.
20. 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.
21. 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.
22. 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.
23. 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.
24. 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. J. Du, Y. Liu and Y. Yang, *An oscillation-free bound-preserving discontinuous Galerkin method for multi-component chemically reacting flows*, submitted to Journal of Scientific Computing.
2. 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*, submitted to Transportation Research Part B.
3. L. Yang, H. Liang, J. Du and S.C. Wong, *Positivity-Preserving Discontinuous Galerkin Methods on Triangular Meshes for Macroscopic Pedestrian Flow Model*, submitted to Journal of Advanced Transportation.
4. 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.

5. H. Liang, L. Yang, J. Du, C.-W. Shu, and S.C. Wong, *Crowd pressure and turbulence in crowd disasters*, submitted to PNAS Nexus.

## Research Grants

- 2021-2026: *Modeling and numerical computation of partial differential equations for aero-engine nacelle problems*.  
National Key R&D Program of China (Grant No. 2021YFA0719200). Ministry of Science and Technology of the People's Republic of China. Program Principle Investigator. 3,300,000 RMB.
- 2019-2021: *High Order Discontinuous Galerkin Methods on Point Clouds*.  
Youth Program of National Natural Science Foundation of China (Grant No. 11801302). Principle Investigator. 250,000 RMB.
- 2022: Tsinghua University Initiative Scientific Research Program. Principle Investigator. 100,000 RMB.
- 2019-2022: *Research on Mathematical Theory and Fast Algorithm for Waveform Based Earthquake Location*.  
General Program of National Natural Science Foundation of China. Participant. 108,000 RMB.
- 2019-2021: *Unbalanced Optimal Transport: Theory and Application*.  
Tsinghua University Initiative Scientific Research Program. Participant.

## Teaching

- Fall 2017, *Linear Algebra*, 10421094-4, Tsinghua University.
- Spring 2018, *Discontinuous Galerkin Methods*, Tsinghua University.
- Fall 2018, *Linear Algebra*, 10421094-12, Tsinghua University.
- Spring 2019, *Numerical Methods for PDEs*, 60420084-2, Tsinghua University.
- Fall 2019, *Linear Algebra*, 10421324-6, Tsinghua University.
- Fall 2019, *Theory and Applications of Numerical Methods for Conservation Laws*, 80421314-0, Tsinghua University.
- Spring 2020, *Discontinuous Galerkin Methods*, 80421364-0, Tsinghua University.
- Fall 2020, *Linear Algebra*, 10421324-11, Tsinghua University.
- Fall 2021, *Linear Algebra*, 10421324-2, Tsinghua University.
- Spring 2022, *Discontinuous Galerkin Methods*, 80421364-0, Tsinghua University.
- Fall 2022, *Linear Algebra*, 10421324-9, Tsinghua University.
- Spring 2023, *Discontinuous Galerkin Methods*, 10421324-9, Tsinghua University.

## Post-doc Mentorship

- Liangze Yang, September 2021–present.

Yanqi Lake Beijing Institute of Mathematical Sciences and Applications.

Research area: Modeling and computation of traffic flow and pedestrian flow problems.

Publications:

- 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, to appear.
- L. Yang, H. Liang, J. Du and S.C. Wong, *Positivity-Preserving Discontinuous Galerkin Methods on Triangular Meshes for Macroscopic Pedestrian Flow Model*, submitted to Journal of Advanced Transportation.
- 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.
- 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*, submitted to Transportation Research Part B.
- H. Liang, L. Yang, J. Du, C.-W. Shu, and S.C. Wong, *Crowd pressure and turbulence in crowd disasters*, submitted to PNAS Nexus.

## Graduate Student Supervision

- Chengyuan Wu, August 2019 – present.

Research area: Numerical solutions for PDEs and applications in traffic flow problem.

Publication:

- 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*, submitted to Transportation Research Part B.

Awards:

- August 2019, Outstanding student of Tsinghua University graduate summer school
- October 2020, Outstanding student leaders of Tsinghua University
- 2020, 2021, Tsinghua University second class scholarship for overall excellence
- December 2021, Outstanding campers of the 3rd international organization talent training camp of Tsinghua University
- September 2022, Ph.D. scholarship at YMSC

## Undergrad Student Mentorship

- Zhengwen Zhou, 2020.

Thesis: High order WENO methods for a continuum model for pedestrian flows.

## Professional Services

- Workshop and Conference Organization
  - Applied and Computational Math Colloquium, Yau Mathematical Sciences Center, Tsinghua University. Fall 2022.
  - Tsinghua-BIMSA Computational & Applied Mathematics (CAM) Seminar. Fall 2021. Spring 2022.
  - Workshop on Efficient Numerical Algorithms and Data Dimensionality Reduction for Aero Engine Nacelle Models, Yau Mathematical Sciences Center, Tsinghua University, October 21, 2022.
  - Workshop on High Order and High Performance Numerical Schemes for Scientific Computing, Yau Mathematical Sciences Center, Tsinghua University, December 7-8, 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.
- 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 of Computational Physics: X
  - Journal on Numerical Methods and Computer Applications
  - Journal of Scientific Computing
  - Transportmetrica B: Transport Dynamics

## Lectures and Presentations

- Invited Conference/Workshop Talk

- Workshop on Modeling and Simulations for Complex System, Beijing Computational Science Research Center, March 25-26, 2023.  
Presentation: *High order bound preserving methods for compressible multi-species flow with chemical reactions.*
- Workshop on Computational Mathematics, Beijing University of Technology, March 18-19, 2023.  
Presentation: *High order bound preserving methods for compressible multi-species flow with chemical reactions.*
- The 9th International Congress of Chinese Mathematicians (ICCM), Nanjing, China, July 31-August 5, 2022.  
45 minutes lecture: *High order bound preserving methods for compressible multi-species flow with chemical reactions.*
- The 11th International Conference on Scientific Computing and Applications (IC-SCA), Xiamen, China, May 27-30, 2019.  
Presentation: *Maximum-principle-preserving third-order local discontinuous Galerkin method for convection-diffusion equations on overlapping meshes.*
- Workshop on DG Methods and Related Problems, Zhejiang University, Hangzhou, China, May 24-25, 2019.  
Presentation: *Maximum-principle-preserving third-order local discontinuous Galerkin method for convection-diffusion equations on overlapping meshes.*
- Workshop on Discontinuous Galerkin Methods, University of Science and Technology of China, November 22-24, 2018.  
Presentation: *Maximum-principle-preserving third-order LDG method for convection-diffusion equations on overlapping meshes.*
- The Fourth International Workshop on the Development and Application of High-order Numerical Methods, Nanjing, China, May 31-June 4, 2018.  
Presentation: *Local discontinuous Galerkin methods for convection-diffusion equations on overlapped meshes.*
- The Hong Kong Mathematical Society Annual General Meeting 2017, Hong Kong University of Science and Technology, May 20, 2017.  
Presentation: *A high order method for solving conservation laws on arbitrarily distributed point clouds.*
- International Conference on Applied Mathematics 2016, Liu Bie Ju Centre for mathematical Sciences, City University of Hong Kong, May 30-June 2, 2016.  
Presentation: *An adaptive SDG method for the Stokes system.*

- Invited Minisymposium Talk

- 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.  
Presentation: *High order bound preserving methods for compressible multi-species flow with chemical reactions.*

- 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.  
Presentation (Online): *High order conservative bound preserving time integrations and applications.*
- 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.  
Presentation: *Third-order bound-preserving DG methods for stiff multispecies and multi-reaction detonations.*
- Minisymposium on finite element and discontinuous Galerkin methods, The 4th Beijing-Tianjin-Hebei Conference on Computational Mathematics, Tianjin, China, August 24-27, 2019.  
Presentation: *Maximum-principle-preserving third-order local discontinuous Galerkin method for convection-diffusion equations on overlapping meshes.*
- 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.  
Presentation: *High-order bound-preserving DG methods for stiff multispecies and multi-reaction detonations.*
- 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.  
Presentation: *High-order bound-preserving DG methods for stiff multispecies and multi-reaction detonations.*
- 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.  
Presentation: *Discontinuous Galerkin methods with staggered hybridization for linear elastodynamics.*
- Invited Seminar Talk
  - Seminar at College of Science, Nanjing University of Posts and Telecommunications, Nanjing, China, December 12, 2022.  
Presentation (Online): *High order bound preserving methods for compressible multi-species flow with chemical reactions.*
  - Seminar at School of Mathematical Sciences, Xiamen University, Xiamen, China, October 13, 2022.  
Presentation (Online): *High order bound preserving methods for compressible multi-species flow with chemical reactions.*
  - Seminar at College of Mathematics and System Science, Xinjiang University, Xinjiang, China, April 20, 2022.  
Presentation (Online): *High order bound preserving methods for compressible multi-species flow with chemical reactions.*



- Seminar at Institute of Computational Mathematics and Scientific/Engineering Computing, Academy of Mathematics and Systems Science Chinese Academy of Sciences, Beijing, China, November 24, 2021.  
Presentation (Online): *High order conservative bound preserving time integrations and applications.*
- Seminar at School of Mathematics, Southern University of Science and Technology, Shenzhen, China, November 10, 2021.  
Presentation (Online): *High order bound preserving methods for compressible multi-species flow with chemical reactions.*
- Seminar at Yanqi Lake Beijing Institute of Mathematical Sciences and Applications, Beijing, China, July 24, 2020.  
Presentation: *Conservative exponential Range-Kutta methods and applications.*
- Seminar at School of Mathematics, HeFei University of Technology, Hefei, China, November 23, 2019.  
Presentation: *Numerical methods in computational fluid dynamics.*
- Seminar at Beijing Computational Science Research Center, Beijing, China, October 10, 2019.  
Presentation: *High-order bound-preserving DG methods for stiff multispecies and multi-reaction Detonations.*
- Seminar at School of Mathematical Sciences, University of Science and Technology of China, Hefei, China, July 1, 2019.  
Presentation: *High-order bound-preserving DG methods for stiff multispecies and multi-reaction detonations.*
- Seminar at School of Mathematical Sciences, Zhejiang University, Hangzhou, China, January 4, 2019.  
Presentation: *High-order schemes for conservation laws on arbitrarily distributed point clouds with a simple WENO limiter.*
- Seminar at College of Transportation Engineering, Tongji University, Shanghai, China, January 7, 2018.  
Presentation: *Predictive continuum dynamic user-optimal models for urban cities.*
- Seminar at School of Mathematical Sciences, University of Science and Technology of China, Hefei, China, June 8, 2017.  
Presentation: *A high order method for solving conservation laws on arbitrarily distributed point clouds.*

## Administrative Accomplishment

### Contributions to Mathematics Contest

- October 31, 2021, S.-T. Yau High School Girls' Mathematics Contest, interviewer.
- Spring 2022, College Mathematics Contest, providing training sessions for students.
- Spring 2023, College Mathematics Contest, providing training sessions for students.

## Contributions to Graduate Student Recruitment

- December 12, 2017, interviewer.
- April 2018, recruitment at University of Science and Technology of China and Nanjing University.
- May 19, 2018, interviewer.
- April 2019, recruitment at Nankai University and Tianjin University.
- June 2, 2019, interviewer.
- June 29, 2020, interviewer.

## Contributions to Qiuzhen College

- Yau Mathematical Sciences Talents Program
  - April 5, 2018, student recruitment, interviewer.
  - October 27, 2018, student recruitment, grading examination papers.
- Yau Mathematical Sciences Leaders Program
  - October 19, 2021, student recruitment, interviewer.
- Graduate student recruitment
  - June 26, 2022, interviewer.
  - September 2022, setting problems, grading examination papers.
  - September 17, 2022, interviewer.
- Undergraduate Academic Advisors for the 2022-2023 academic year
  - Qianya Luo
  - Xuanzheng Xu

## Other Administrative Accomplishment

- December 2, 2020, Postdoctoral Recruitment, interviewer.
- December, 2021, evaluate ICCM bachelor and master best thesis award.
- Open office hour
  - Fall 2019, 16 hours.
  - Spring 2020, 14 hours.
  - Fall 2020, 16 hours.
  - Fall 2021, 15 hours.
  - Spring 2022, 32 hours.