

# Yue Wu

Division of Applied Mathematics, Brown University, Box F, Providence, RI 02912, USA  
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## PROFILE

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- Computational mathematician and numerical analyst with expertise in numerical methods for partial differential equations, with a strong interest in high-fidelity simulation, high-performance computing, and real-world industrial applications.

## EDUCATION

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- **Ph.D. Candidate in Applied Mathematics** 08/2023–05/2027 (expected)  
Division of Applied Mathematics, Brown University, Providence, RI 02912, USA  
Advisor: *Prof. Chi-Wang Shu*
- **M.Sc. in Applied Mathematics** 08/2023–05/2025  
Division of Applied Mathematics, Brown University, Providence, RI 02912, USA  
GPA: 4.0 / 4.0
- **B.Sc. in Information & Computational Science** 09/2019–06/2023  
School of the Gifted Young, University of Science and Technology of China, Hefei, Anhui 230026, China  
GPA: 3.96 / 4.3, Rank in major: 1st / 43
- Wuxi No. 1 High School, Wuxi, Jiangsu 214031, China 09/2017–06/2019

## RESEARCH INTERESTS

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- Numerical methods for partial differential equations (PDE)
  - Discontinuous Galerkin (DG) finite element methods
  - Finite difference Weighted Essentially Non-Oscillatory (WENO) methods
  - Structure-preserving numerical methods
- Scientific computing
  - Parallel PDE solver development

## PUBLICATIONS AND PREPRINTS

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1. **Y. Wu**, S. Becker, J.-M. Qiu, and X. Zhang. Nonnegative low-rank matrix correction under an orthogonality constraint in conservative Vlasov simulations. submitted to *J. Sci. Comput.* arXiv:2607.26272
2. **Y. Wu** and C.-W. Shu. A positivity preserving and entropy stable nodal discontinuous Galerkin scheme for ideal MHD. submitted to *Commun. Math. Stat.* arXiv:2604.23885
3. **Y. Wu** and C.-W. Shu. Finite difference alternative WENO schemes with Riemann invariant-based local characteristic decompositions for compressible Euler equations. *J. Comput. Phys.*, 537:114104, Sept 2025. DOI: 10.1016/j.jcp.2025.114104. MR4912873.
4. **Y. Wu** and Y. Xu. A high-order local discontinuous Galerkin method for the  $p$ -Laplace equation. *Beijing J. of Pure and Appl. Math.*, 2(1):373–422, Apr 2025. DOI: 10.4310/BPAM.250415002006.

## RESEARCH EXPERIENCE

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1. **Structure-Preserving Discontinuous Galerkin Schemes for Magnetohydrodynamics (MHD)**  
Brown University, Supervisor: *Prof. Chi-Wang Shu* 03/2025–04/2026
  - Investigated all types of time-explicit structure-preserving conservative schemes for ideal MHD.
  - Developed a nodal discontinuous Galerkin scheme that combines positivity preservation and entropy stability for the first time in literature.
2. **Efficient A-WENO Methods for Compressible Euler Equations**  
Brown University, Supervisor: *Prof. Chi-Wang Shu* 09/2024–02/2025
  - Investigated the effect of transform variables in local characteristic decompositions on A-WENO performance and proved the optimal practice.
  - Implemented A-WENO methods using a carefully selected set of Riemann invariants to reduce computational cost.
3. **Discontinuous Galerkin Methods for the  $p$ -Laplace Equation**  
Bachelor's thesis at USTC, Supervisor: *Prof. Yan Xu* 12/2022–06/2023

- Proved rigorous a priori error estimates for a high order local DG scheme.
  - Developed an efficient preconditioned gradient descent method.
4. **Positivity-Preserving Conservative Low Rank Methods for Vlasov Dynamics**  
Purdue University (remote), Supervisor: *Prof. Xiangxiong Zhang* 06/2022–08/2022
- Developed multiple nonnegative low rank correction algorithm under orthogonality constraints using convex optimization and tangent space accelerated projection.
  - Incorporate the algorithm into the dynamic low rank Vlasov solver as a positivity preserving conservative limiter to obtain robust and physically meaningful simulation.
5. **Numerical Simulation of Plasma Equilibrium Evolution in Nuclear Fusion**  
USTC undergraduate research project, Supervisor: *Prof. Mengping Zhang* 06/2021–05/2022
- Developed a parallel hybrid finite difference-pseudo spectral code for resistive MHD in toroidal geometry, and performed long-time simulation of resistive tearing mode instability in tokamaks.
  - Validated the results with researchers from the Institute of Plasma Physics, CAS, and against those from existing open-source codes.

## WORKING EXPERIENCE

1. Algorithms Intern, **Flytrum Tech.**, Wuxi, Jiangsu, China 07/13/2026–07/31/2026
- Developed an adaptive batch sampling algorithm for the parallel interpolating frequency sweep module of the Rainbow-FEM3D software, using a non-intrusive relative error indicator for barycentric rational interpolations within the matrix-valued Löwner framework.
2. R&D Intern, **Rankyee Tech.**, Suzhou, Jiangsu, China 07/26/2024–08/09/2024
- Contributed to development of the symmetric interior penalty discontinuous Galerkin diffusion module for compressible Navier–Stokes equations for the Dimaxer software.

## TEACHING EXPERIENCE

1. TA @ Brown: *APMA 0355 – Applied ODEs with Theory* Fall 2026
2. TA @ Brown: *APMA 1655 – Intro. to Prob. & Stats. with Theory* Spring 2026
3. TA @ Brown: *APMA 0160 – Intro. to Sci. Computing* Fall 2025
4. TA @ Brown: *APMA 1650 – Stat. Inference I* Spring 2025
5. TA @ Brown: *APMA 1210 – OR: Deterministic Models* Fall 2024
6. TA @ USTC: *Computational Methods B* Spring 2022

## PRESENTATIONS AND WORKSHOPS

1. Poster session, the 2024 International Congress of Basic Science (ICBS), Beijing, China 07/2024

## PROFESSIONAL SERVICES

1. Jorunal reviewer for *J. Comput. Phys.* and *J. Sci. Comput.* (since 2025), and *Comput. Math. Appl.* (since 2026)

## HONORS AND AWARDS

- New Lotus Award, the 2023 SGY Rose Scholarship 06/2024
- USTC Outstanding Undergraduate Award 06/2023
- “Chia-Chiao Lin” Gold Medal in Applied and Computational track & Team Silver Medal & Excellence Prize in Analysis and PDEs track, the 14th S.-T. Yau College Student Mathematics Contest 06/2023
- Gold Prize, USTC Outstanding Student Scholarship 10/2022
- Excellence Prize in Analysis and PDEs track, the 13th S.-T. Yau College Student Mathematics Contest 08/2022
- China National Scholarship 12/2021
- Second Prize, the 13th Chinese Mathematics Competitions 12/2021
- China National Scholarship 12/2020
- Third Prize, USTC Freshman Scholarship 09/2019

## PROFESSIONAL SKILLS

- Programming: C++, MATLAB, Python, Fortran 2008, MPI, OpenMP

- Software: NGSolve, FEniCS, MFEM, Mathematica, Tecplot
- Tools: Linux, Git, Jupyter, L<sup>A</sup>T<sub>E</sub>X, Markdown
- Language: Mandarin Chinese, English

## **EXTRACURRICULAR ACTIVITIES**

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- USTC road cycling team member, USTC

09/2019–06/2023

last update: September 12, 2026