Hongjie Jiang

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Education

Sep, 2022 – present   **B.S. in Mathematics**, Peking University
Relevant Coursework: Partial Differential Equations, Real Analysis, Numerical Algebra, Introduction to Numerical Analysis, Optimization Methods, Foundations of Machine Learning, Fluid Mechanics, etc.
GPA: 3.87/4.00, Ranked 3rd in My Major

Standard Tests

March, 5th, 2025   **The Test of English as Foreign Language (TOEFL–IBT) :**
Total 108: 30 in reading, 29 in listening, 25 in speaking, 24 in writing

August, 25th, 2024   **Graduate Record Examination(GRE) :**
Total 327+3.5: 157 in Verbal Reasoning, 170 in Quantitative Reasoning, 3.5 in Analytical Writing

Researches and Projects

June, 2025 – Present   **Solving PDEs with Machine Precision: TENG with Arbitrary Boundaries and Multi-variables**
Supervised by Prof. D. Luo
Introduction: Explored Time-Evolving Natural Gradient (TENG) methods for machine-precision PDE solving, extending the framework to arbitrary boundary conditions and multi-variable settings.
My Work:

- Developed and implemented optimization algorithms to handle Neumann and Robin boundary conditions.

- Designed neural architectures tailored for multi-variable PDEs.

- Conducted numerical experiments with traditional solvers to benchmark precision and efficiency.

Oct, 2024 – Aug, 2025   **Numerically Solving Schrödinger Equation: Enhancing PESNet for Multistate Fitting**
Supervised by Prof. L. Wang
Introduction: Focused on enhancing PESNet to simultaneously fit multiple lowest-energy states, enabling accurate ground-state energy estimation even in the presence of state crossings.
My Work:

- Implemented major code modifications for multistate fitting.

- Designed algorithms to correctly identify and match states across energy crossings.

- Refined training strategies and validated results on molecular systems.

Researches and Projects (continued)

Dec, 2023 – June, 2025   **PDE Foundation Model: Mesh-free and Unsupervised PDE Solver**
Supervised by Prof. B. Dong
Introduction: Focused on developing a mesh-free method to solve PDEs and inverse problems, enabling fast adaptation to new parameters for applications in scientific computing.
My Work:

- Designed a 3D encoder architecture inspired by video coding techniques.

- Generated datasets using traditional PDE solvers and designed cross-validation pipelines for data filtering.

- Contributed to pretraining/finetuning and baseline model comparisons.

April, 2023 – June, 2023   **PKUDSA Eraser: A Self-Designed Program for Assignment Battles**
Supervised by Prof. B. Chen, Prof. Y. Liu, in collaboration with the TA team
Introduction: Developed an online program allowing students to participate in game-like battles, with a visualization of battle processes.
My Work:

- Created sample codes and APIs for player submissions.

- Detected and fixed invalid operations during closed beta testing.

- Improved gameplay balance through theoretical analysis.

Publications

arXiv Preprint

1   Z. Ye, Z. Liu, B. Wu, **H. Jiang**, L. Chen, M. Zhang, X. Huang, Q. M. J. Zou, H. Liu, and B. Dong, *Pdeformer-2: A versatile foundation model for two-dimensional partial differential equations*, 2025. arXiv: 2507.15409 [math.NA]. 🔗 URL: https://arxiv.org/abs/2507.15409.

Skills

Languages   ◼ English (Fluent), Mandarin Chinese (Native).

Programming Languages   ◼ Python, C/C++, MATLAB, LaTeX, Markdown

Deep Learning Framework   ◼ PyTorch, MindSpore, JAX with GPU programming experience.

Numerical Methods   ◼ Familiarity with multiple NPDE (FDM, FEM, Spectral) and optimization methods.

Theoretical Skills   ◼ Strong foundation in fundamental mathematics (linear algebra, multivariable calculus) and physics (classical mechanics, fluid mechanics, quantum mechanics).

Miscellaneous Experience

Awards and Achievements

Sep, 2024   🔖 **China Merchants Securities(CMS) Scholarship**, Peking University

  🔖 **Academic Excellence Scholarship**, Peking University

June, 2024   🔖 **Applied Mathematics Honors Program**, the School of Mathematical Sciences, Peking University

Sep, 2023   🔖 **The Peking University Zheng Geru Scholarship**, Peking University

  🔖 **Merit Student**, Peking University

Sep, 2022   🔖 **Scholarship for Freshman**, Peking University

May, 2022   🔖 **The Winner of Gold Medal in the 22nd Asian Physics Olympiad**, Asian Physics Olympiad