Jiayi Zhou

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Education

School of Mathematical Sciences, Peking University Beijing, China
B.S. in Computational Mathematics *2022 - 2026 (expected)*
GPA: 3.624 / 4.00
Selected Courses: Ordinary Differential Equations (90.5), Partial Differential Equations (91), Mathematical Statistics (100), Inverse Problems and Data Assimilation (95).

Publications

Jiayi Zhou, Valentin Duruisseaux, Daniel Zhengyu Huang, Anima Anandkumar. Boundary-Augmented Neural Operators for Better Generalization to Unseen Geometries. *NeurIPS AI4Science Workshop*, 2025

Chenyu Zeng*, Yanshu Zhang*, **Jiayi Zhou***, Yuhan Wang, Zilin Wang, Yuhao Liu, Lei Wu, Daniel Zhengyu Huang. Point Cloud Neural Operator for Parametric PDEs on Complex and Variable Geometries. *Computer Methods in Applied Mechanics and Engineering*, 2025.

Jiayi Zhou, Atharva Aalok, Valentin Duruisseaux, Xinyi Li, Juan Alonso, Anima Anandkumar. Robust Shape Optimization with Neural Shape Representations and Neural Operators. In preparation.

Research Experiences

Shape Optimization with Neural Representations and Neural Operators | Caltech CMS
Advisor: Prof. Anima Anandkumar *Jun 2025 - Present*

- Fully funded by Caltech
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- xxxxx

Boundary Neural Operators and Geometric Generalization | Peking University & Caltech CMS
Advisors: Prof. Daniel Zhengyu Huang, Prof. Anima Anandkumar *Sep 2024 - Present*

- Developed a boundary neural operator architecture to effectively encode boundary geometry and conditions and constructed a high-quality dataset of Poisson problems using the boundary element method.
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Operator Learning for Singularity and Scale-Invariance | BIMSA
Advisor: Prof. Mahdi Hormozi *Apr 2025 - Jun 2025*

- Design a Mellin transform-based framework to model singularities while preserving scale-invariance properties.
- Analyzed scale-invariant behaviors in classical equations such as the Lévy and Smoluchowski equations.

Operator Learning with Complex and Variable Geometries | Peking University
Advisor: Prof. Daniel Zhengyu Huang *Feb 2024 - Apr 2025*

- Extended the Fourier Neural Operator to support complex geometries and irregular grids, explicitly accounting for the effects of point distributions.
- Investigated local basis functions such as Gaussian kernels and PCA-based bases to capture localized features, achieving promising results on benchmarks.
- Explored low-rank approximations for convolution kernels, including $\mathcal{H}$-matrix structures, to reduce parameter counts and mitigate overfitting

Awards & Honors

SURF Award, Caltech *2025*

The First Prize, China Undergraduate Mathematical Contest in Modelling *2024*

The Third Prize Scholarship, Peking University *2024*

The Third Prize Scholarship, Peking University *2023*

Skills

Languages: Chinese, English (TOEFL 107, GRE 325+3)

Programming: Python, C++, MATLAB, LaTeX.

Hobbies: Badminton, Piano, Saxophone.