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Jingmin Sun Ph.D.

Education

Department of Mathematical Science, Carnegie Mellon University Pittsburgh, PA
Ph.D. in Mathematical Science 2020.09 - 2025.05 *(expected)*

- Advisor: Prof. Hayden Schaeffer (now Prof. in Mathematics at UCLA)
- Research area: Operator learning, PDE-foundation Model, Optimization, Control problem

Department of Mathematical Science, Rensselaer Polytechnic Institute Troy, NY
Ph.D. student in Mathematics 2020.01 - 2020.05
B.S. in Mathematics 2017.09 - 2019.12

- GPA: 3.98/4.00; Summa Cum Laude

Publications

1. Derek Jollie, **Jingmin Sun**, Zecheng Zhang, and Hayden Schaeffer. Time-series forecasting and refinement within a multimodal PDE foundation model. Journal of Machine Learning for Modeling and Computing, 6(2), 77–89.

2. **Jingmin Sun**, Yuxuan Liu, Zecheng Zhang, and Hayden Schaeffer. Towards a foundation model for partial differential equations: Multi-operator learning and extrapolation. Physical Review E, 111(3), 035304. https://doi.org/10.1103/PhysRevE.111.035304

3. Yuxuan Liu, **Jingmin Sun**, Xinjie He, Griffin Pinney, Zecheng Zhang, and Hayden Schaeffer. PROSE-FD: A Multimodal PDE Foundation Model for Learning Multiple Operators for Forecasting Fluid Dynamics, arXiv preprint arXiv:2409.09811 (2024).
Foundation model for science workshop at NeurIPS 2024

Preprints

1. **Jingmin Sun**, Zecheng Zhang, and Hayden Schaeffer. LeMON: Learning to Learn Multi-Operator Networks, arXiv preprint arXiv:2408.16168 (2024).

2. Yuxuan Liu, **Jingmin Sun**, and Hayden Schaeffer. BCAT: A Block Causal Transformer for PDE Foundation Models for Fluid Dynamics, arXiv preprint arXiv:2501.18972 (2025).
Under review.

On going papers

1. **Jingmin Sun**, Zecheng Zhang, and Hayden Schaeffer. BelNet for Control Problems (in progress)

2. Xinjie He, **Jingmin Sun**, Zecheng Zhang, and Hayden Schaeffer. Efficiency and Computer Memory Enhancement of PDE-Foundation Model. (in progress)

3. Min Zhu, Kaiyuan Huang, **Jingmin Sun**, Lu Lu, Zecheng Zhang, and Hayden Schaeffer. Enhancing the Interpretability of the PDE-Foundation Model. (in progress)

4. Yanming Kang, **Jingmin Sun**, Giang Tran, Hans De Sterck, Hayden Schaeffer. Symbolic Information Analysis for PDE-foundation model. (in progress)

Projects

Enhancing the Interpretability of the PDE-Foundation Model 2024.06 -present
Work with Prof. Lu Lu's group, Prof. Zecheng Zhang and Prof. Hayden Schaeffer

Symbolic Information Analysis for PDE-Foundation Model 2024.06 -present
Work with Prof. Giang Tran's group, Prof. Hans De Sterck and Prof. Hayden Schaeffer

Efficiency and Memory Enhancement of PDE-Foundation Model 2024.06 -present
Work with Prof. Zecheng Zhang and Prof. Hayden Schaeffer's group

BelNet on Dynamical System 2023.05 - present
Work with Prof. Zecheng Zhang and Prof. Hayden Schaeffer

Kernel Analog Forecasting with Controls 2022.05 - 2023.05
Work with Prof. Rachel Ward and Prof. Hayden Schaeffer

On Sticky Brownian Motion and Numerical Solution 2020.01 - 2020.05
Rensselaer Polytechnic Institute, work with Prof. Fengyan Li

Teaching And Mentoring

REU Co-Mentor | University of California, Los Angeles Summer 2024
TA for Numerical Methods | Carnegie Mellon University Spring, Fall 2024
TA for Computational Linear Algebra | Carnegie Mellon University Fall 2023
TA for Linear Algebra for Data Science | Carnegie Mellon University Fall 2023
TA for Probability (Graduate Level) | Carnegie Mellon University Spring 2023
TA for Numerical PDEs | Carnegie Mellon University Fall 2022
TA for Integration and Approximation | Carnegie Mellon University Spring 2022
TA for Probability | Carnegie Mellon University Fall 2021
TA for Matrix Algebra | Carnegie Mellon University Summer 2021
TA for Numerical Linear Algebra | Carnegie Mellon University Spring 2021
TA for Principle of Analysis 1 | Carnegie Mellon University Fall 2020
TA for Linear Algebra | Rensselaer Polytechnic Institute Spring 2020

Awards

- **Travel Award,** SIAM Conference on Mathematics of Data Science 2024.07
- **The Max Hirsch Prize,** Rensselaer Polytechnic Institute 2020.05

Presentations

Towards a foundation model for partial differential equations: Multi-operator learning and extrapolation 2024.10
SIAM Conference on Mathematics of Data Science

LeMON: Learning to Learn Multi-Operator Networks 2024.10
Prof. Lu Lu's Seminar at Yale University

PDE Foundation Model: Generalization, Meta-learning and more 2024.09
Applied and Computational Math Seminar at Florida State University

Predicting Operators and Symbolic Expressions using Multimodal Transformers - PDE 2024.03
Prof. Hayden Schaeffer's Seminar at University of California, Los Angeles

Skills

Languages: English, Chinese (Native).

Programming:

- Foundation model engineering and programming (e.g. Transfer learning, meta-learning)
- High-Performance Computing (e.g., Linux/Unix, Bash, CUDA)
- Python (e.g., NumPy, PyTorch, JAX, TensorFlow, SciPy, scikit-learn)
- MATLAB
- R
- LaTeX
- Markdown
- Git/ GitHub
- HTML/ CSS