Liu Yang

Title: Assistant Professor (Tenure Track)
Presidential Young Professor
Department of Mathematics
National University of Singapore

Email: yangliu@nus.edu.sg

Website: https://scaling-group.github.io/

EDUCATION

Brown University, Providence, RI, USA
Ph.D. in Applied Mathematics, May 2021
Sc.M. in Applied Mathematics, May 2018
Advisor: George Karniadakis
Dissertation: Generative Adversarial Networks for Physics-Informed Learning

Tsinghua University, Beijing, China
B.E. in Engineering Mechanics, July 2016
Tsien Hsue-Shen Elite Class in Mechanics
Outstanding Graduate Honor (Top 10%)

WORK

National University of Singapore, Singapore
Assistant Professor, Department of Mathematics, July 2024-present
Presidential Young Professor

University of California, Los Angeles, Los Angeles, CA, USA
Assistant Adjunct Professor, Department of Mathematics, July 2022-June 2024
Working with Prof. Stanley Osher.

WeRide Corp, San Jose, CA, USA
Software Engineer, June 2021-June 2022
Working on autonomous driving systems.

RESEARCH INTERESTS

Artificial Intelligence for Science, Physics-Informed Learning, Generative Models, In-Context Learning, Reinforcement Learning

AWARDS

- Presidential Young Professorship, National University of Singapore (2024)
- David Gottlieb Memorial Award, Brown University, USA (2021)
- Outstanding Graduate Honor (Top 10%), Tsinghua University, China (2016)
- Scholarship for Academic Excellence, Tsinghua University, China (2013, 2015)
- Tsien Hsue-Shen Elite Class in Mechanics, Tsinghua University, China (2012-2016)

PUBLICATIONS & PREPRINTS

See details in my Google Scholar profile. Citations over 6000, h-index 12, by October 2024

$*$ indicates equal contribution.

- **Liu Yang**, and Stanley J. Osher. "PDE Generalization of In-Context Operator Networks: A Study on 1D Scalar Nonlinear Conservation Laws" *Journal of Computational Physics* 519 (2024): 113379.
- **Liu Yang**, Siting Liu, and Stanley J. Osher. "Fine-Tune Language Models as Multi-Modal Differential Equation Solvers" *arXiv:2308.05061* (2023).

- **Liu Yang**, Siting Liu, Tingwei Meng, and Stanley J. Osher. "In-Context Operator Learning With Data Prompts for Differential Equation Problems" *Proceedings of the National Academy of Sciences* 120.39 (2023): e2310142120.
- *Xuhui Meng, ***Liu Yang**, Zhiping Mao, José del Águila Ferrandis, and George Em Karniadakis. "Learning Functional Priors and Posteriors from Data and Physics." *Journal of Computational Physics* 457 (2022): 111073.
- **Liu Yang**, Constantinos Daskalakis, and George E. Karniadakis. "Generative Ensemble Regression: Learning Particle Dynamics From Observations of Ensembles with Physics-Informed Deep Generative Models" *SIAM Journal on Scientific Computing* 44.1 (2022): B80-B99.
- **Liu Yang**, Tingwei Meng, and George E. Karniadakis. "Measure-Conditional Discriminator with Stationary Optimum for GANs and Statistical Distance Surrogates" *arXiv:2101.06802* (2021).
- George Em Karniadakis, Ioannis G. Kevrekidis, Lu Lu, Paris Perdikaris, Sifan Wang, and **Liu Yang**. "Physics-Informed Machine Learning" *Nature Reviews Physics* 3.6 (2021): 422-440. (alphabetical order)
- ***Liu Yang**, *Xuhui Meng, and George Em Karniadakis. "B-PINNs: Bayesian Physics-Informed Neural Networks for Forward and Inverse PDE Problems With Noisy Data" *Journal of Computational Physics* 425 (2021): 109913.
- Xiaoli Chen, **Liu Yang**, Jinqiao Duan, and George Em Karniadakis. "Solving Inverse Stochastic Problems From Discrete Particle Observations Using the Fokker–Planck Equation and Physics-Informed Neural Networks" *SIAM Journal on Scientific Computing* 43.3 (2021): B811-B830.
- *Dixia Fan, ***Liu Yang**, *Zhicheng Wang, Michael S. Triantafyllou, and George Em Karniadakis. "Reinforcement Learning for Bluff Body Active Flow Control in Experiments and Simulations" *Proceedings of the National Academy of Sciences* 117.42 (2020): 26091-26098.
- **Liu Yang**, and George Em Karniadakis. "Potential Flow Generator With L_2 Optimal Transport Regularity for Generative Models" *IEEE Transactions on Neural Networks and Learning Systems* 33.2 (2020): 528-538.
- **Liu Yang**, Dongkun Zhang, and George Em Karniadakis. "Physics-Informed Generative Adversarial Networks for Stochastic Differential Equations" *SIAM Journal on Scientific Computing* 42.1 (2020): A292-A317.
- Guofei Pang, **Liu Yang**, and George Em Karniadakis. "Neural-Net-Induced Gaussian Process Regression for Function Approximation and PDE Solution" *Journal of Computational Physics* 384 (2019): 270-288.
- Dongkun Zhang, **Liu Yang**, and George Em Karniadakis. "Bi-Directional Coupling Between a PDE-Domain and an Adjacent Data-Domain Equipped With Multi-Fidelity Sensors" *Journal of Computational Physics* 374 (2018): 121-134.

TEACHING

- Topics in Applied Mathematics (on the topic of scientific machine learning), National University of Singapore (Fall 2024)
- Instructor, Program in Computing 16A: Python with Application, UCLA (Winter 2023, Spring 2023, Fall 2023)
- Instructor, Program in Computing 10A: Introduction to Programming (C++), UCLA (Fall 2022, Spring 2024)
- Instructor, Program in Computing 10B: Intermediate Programming (C++), UCLA (Winter 2024)
- Teaching assistant, Summer@ICERM 2020 Program: Fast Learning Algorithms for Numerical Computation and Data Analysis, The Institute for Computational and Experimental Research in Mathematics (Summer 2020)

- Teaching assistant, Operations Research: Deterministic Models, Brown University (Spring 2020)
- Teaching assistant, Statistical Inference, Brown University (Fall 2019)

SERVICES

Peer reviewer for: *Journal of Machine Learning Research, SIAM Journal on Scientific Computing, Computer Methods in Applied Mechanics and Engineering, Journal of Computational Physics, etc.*

SELECTED TALKS

- In-Context Operator Learning with Data Prompts for Differential Equation Problems. Engineering Mechanics Institute Conference (May 28-31, 2024)
- The American Mathematical Society's Mathematics Research Communities Program (May 28–June 3, 2023)
- Generative Ensemble-Regression: Learn Particle Dynamics from Observations of Ensembles with Physics-Informed Deep Generative Models. SIAM Conference on Applications of Dynamical Systems (May 14-18, 2023)
- Generative Ensemble-Regression: Learn Particle Dynamics from Observations of Ensembles with Physics-Informed Deep Generative Models. U.S. National Congress on Computational Mechanics (July 25-29, 2021)
- Generative Ensemble-Regression: Learning Stochastic Dynamics from Discrete Particle Ensemble Observations. SIAM Conference on Computational Science and Engineering (March 1-5, 2021)
- Physics-Informed Neural Networks (PINNs), Physics-Informed GANs and Bayesian PINNs. IBM Corporation (July 23, 2020)
- Physics-Informed GANs for Stochastic Differential Equations. SIAM Conference on Computational Science and Engineering (February 25-March 1, 2019)