

EDUCATION

- **University of Notre Dame** Notre Dame, IN, USA
Ph.D. candidate - Aerospace & Mechanical Engineering Jan 2020 - Present
 - **Advisor:** Professor Wang, Jian-Xun
 - **Research interests:** Scientific machine learning, Dynamic system modelling and controlling, Differentiable programming, Computational mechanics, Turbulence
- **Xi'an Jiaotong University** Xi'an, Shannxi, China
Bachelor of science - Energy & Power Engineering; GPA: 3.82 Aug 2015 - June 2019

PUBLICATIONS — Peer-reviewed journal paper

- **Liu, X.Y.**, Zhu, M., Lu, L., Sun, H. and Wang, J.X., 2024. [Multi-resolution partial differential equations preserved learning framework for spatiotemporal dynamics](#). *Communications Physics*, 7(1), p.31.
- **Liu, X.Y.** and Wang, J.X., 2021. [Physics-informed Dyna-style model-based deep reinforcement learning for dynamic control](#). *Proceedings of the Royal Society A*, 477(2255), p.20210618.
- Movahhedi, M.*, **Liu, X.Y.***, Geng, B., Elemans, C., Xue, Q., Wang, J.X. and Zheng, X., 2023. [Predicting 3D soft tissue dynamics from 2D imaging using physics informed neural networks](#). *Communications Biology*, 6(1), p.541. *Co-first author

PAPERS UNDER REVIEW

- **Liu, X.Y.**, Bodaghi, D., Xue, Q., Zheng, X. and Wang, J.X., 2024. [Asynchronous Parallel Reinforcement Learning for Optimizing Propulsive Performance in Fin Ray Control](#). arXiv preprint arXiv:2401.11349. Submitted to *Engineering with Computers*
- Du, P., Parikh, M.H., Fan, X., **Liu, X.Y.** and Wang, J.X., 2024. [CoNFILD: Conditional Neural Field Latent Diffusion Model Generating Spatiotemporal Turbulence](#). arXiv preprint arXiv:2403.05940. Submitted to *Nature Machine Intelligence*

CONFERENCES

- **Liu, X.Y.**, Fan, X.T. and Wang, J.X. MuRFiV-Net: A Multi-Resolution Finite-Volume Inspired Neural Network for Predicting Spatiotemporal Dynamics APS DFD, November 2023
- **Liu, X.Y.** and Wang, J.X. Predicting parametric spatiotemporal dynamics by multi-resolution pde structure-preserved deep learning APS DFD, November 2022
- **Liu, X.Y.**, Bodaghi, D., Zheng, X., Xue, Q. and Wang, J.X. Accelerating deep reinforcement learning with physics-informed models and asynchronous parallel training SIAM UQ, April 2022
- **Liu, X.Y.**, Bodaghi, D., Zheng, X., Xue, Q. and Wang, J.X. Deep reinforcement learning for fish fin ray control APS DFD, December 2021
- **Liu, X.Y.** and Wang, J.X. Physics-informed Dyna-Style Model-Based Deep Reinforcement Learning for Dynamic Control. SIAM Annual Meeting (AN21), July 2021

EXPERIENCES

- Collaboration project with Google research: Synthetic Turbulence Inlet Generation Based on Conditional Neural Field Encoded Latent Diffusion Model Remote, Aug, 2023 - Present
 - Training diffusion model in latent space compressed by conditional neural field. Efficiently generate versatile of turbulent inlet conditions. Significantly speeding up the downstream high-fidelity numerical simulations
- High-performance GPU cluster CoMSAIL design & maintenance Notre Dame, Mar, 2021 - Present
 - Hardware configuration
 - * Designed and assembled 2 high performance Linux GPU servers for Prof. Wang's research group, with 546 TFLOPS total computational capability.
 - * Designed and helped purchase 4 GPU servers as well as 2 file servers, with 24 NVIDIA GPUs in total, providing 1474.8 TFLOPS computing power.
 - Software configuration
 - * Setup a unified, distributed file system for the entire CoMSAIL cluster (including the aforementioned 8 servers) via Network File System (NFS). The file system consists of 68 TB of high speed SSD as well as 50 TB of HDD. Each configured as RAID 5 disk array for redundancy.
 - * **Environment Modules** is deployed to provide an easy way for users to manage their environment and software versions.

The CoMSAIL cluster provides over 2 PFLOPS combined computing power. During the 2 years of service, the cluster has served over 20 users including post-docs, graduate and undergrad students at the University of Notre Dame.

HONORS AND AWARDS

- USACM Thematic Conference on Uncertainty Quantification for Machine Learning Integrated Physics Modeling (UQ-MLIP) Travel Award Aug, 2024
- Society of Engineering Science Annual Technical Meeting (SES2022) funding support Oct, 2022
- USACM Thematic Conference on Uncertainty Quantification for Machine Learning Integrated Physics Modeling (UQ-MLIP) Travel Award Aug, 2022
- USNCCM16 (16th U.S. National Congress on Computational Mechanics) Conference Award May, 2021
- 3rd Prize, National University Student Social Practice & Science Contest on Energy Saving & Emission Reduction 2018

SKILLS

- **Coding:** Python, Julia, Matlab
- **Deep Learning Frameworks:** Pytorch, Jax, Flax, Haiku, Optax
- **Engineering software:** OpenFoam, SolidWorks, Ansys Fluent, Ansys ICEM
- **Other tools:** L^AT_EX