Xiaodong Feng

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Work Experience

2024 – 2026 **BNU-HKBU United International College**,Division of Science and Technology, Zhuhai, China

Postdoc, Mentor: *Dr. Tao Tang*

Education

2019 – 2024 **Institute of Computational Mathematics and Scientific/Engineering Computing** , Academy of Mathematics and Systems Science (AMSS), Chinese Academy of Sciences (CAS)

Doctoral Student, Advisor: *Dr. Tao Zhou*

Research: Scientific machine learning, Uncertainty quantification, Bayesian inverse problem

PhD thesis: Uncertainty quantification in scientific machine learning

2015 – 2019 **Beijing Normal University**, School of Mathematical sciences, Beijing, China

Bachelor Student, Advisor: *Dr. Hui Zhang*

Research: Numerical methods for Allen-Cahn equations

Research interests

1. High dimensional partial differential equations. Our goal is to develop new adaptive sampling strategies to accelerate training efficiency for physics-informed neural networks and DeepONets. We are also interested in building novel surrogate model to deal with partial differential equations with random inputs, furthermore to solve PDE-control and Bayesian inverse problems.
2. Data-driven uncertainty quantification. Our goal is to build fast, scaleable surrogate models to model the data-driven uncertainty. Recently we are interested in Gaussian process, generative model and information bottleneck, etc.
3. Physics-informed generative model and model reduction based on neural networks.

Publications

[1] **Xiaodong Feng**, Li Zeng, Tao Zhou, Solving Time Dependent Fokker-Planck Equations via Temporal Normalizing Flow. Commun. Comput. Phys., 32 (2022), pp. 401-423.

[2] **Xiaodong Feng**, Li Zeng, Gradient-enhanced deep neural network approximations. Journal of Machine Learning for Modeling and Computing. (2022)

[3] **Xiaodong Feng**, Yue Qian, Wanfang Shen. MC-Nonlocal-PINNs: handling nonlocal operators in PINNs via Monte Carlo sampling. Numerical Mathematics: Theory, Methods and Applications, 16 (2023): 769-791.

[4] **Xiaodong Feng**, Xiaoliang Wan, Tao Zhou. Physics-informed IB-UQ, 2024, preprint.

[5] **Xiaodong Feng**, Haojiong Shangguan, Tao Tang, Xiaoliang Wan, Tao Zhou. A hybrid FEM-PINN method for time-dependent partial differential equations. arXiv preprint arXiv:2409.02810, 2024.

Professional Experience

Journal Review: CICP, JCP.

Selected Talks

[1] Deep Neural Networks Coupled Finite Element for Evolution Equations, SIAM UQ24, Trieste, Italy, Feb.27–Mar.1, 2024.

[2] Information bottleneck based uncertainty quantification, International conference on theory and scientific computing of Navier-Stokes, PostTECH, Korea, Jan.13-17, 2025.

Skills

Programing: Latex, Matlab, Python(pytorch, jax, fenics, chaospy).

Language: Chinese (native), and English