

Zhao DING

INFORMATION

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PROFILE

Computational Mathematics PhD candidate at Wuhan University. Expect to enter the job market in 2025. Working on ***solving PDE by deep learning & diffusion model based generation***. With 4 years of experience in scientific computing and 2 years in generative learning.

EDUCATION

- **PhD, 2020-present**

Computational Mathematics
Wuhan University

- **BSc, 2016-2020**

Mathematics and Applied Mathematics
Wuhan University

SKILL

- **Scientific Computing**

in Python, MATLAB, C/C++

- **Deep Learning**

with PyTorch, data parallel training/
inference of diffusion models

- **English**

CET4 (620) CET6 (625) IELTS (6.5)

- **Other**

bash script, git, make, LaTeX, ...

AWARD

- SIAM Award for Student Chapter at Wuhan University, 2024

- First Prize of China Undergraduate Mathematical Contest in Modeling, 2018

RECENT WORK

Working on new ***one-step*** generation scheme derived from diffusion models, exploiting the deterministic nature of ODE, achieving *SOTA* results among methods of the same kind. Participated in algorithm design and numerical implementation.

PUBLICATION

- Zhao Ding, Chenguang Duan, Yuling Jiao, Ruoxuan Li, Jerry Zhijian Yang and Pingwen Zhang (2024). Characteristic Learning for Provable One Step Generation. arXiv:2405.05512.
- Zhao Ding, Chenguang Duan, Yuling Jiao and Jerry Zhijian Yang (2024). Semi-Supervised Deep Sobolev Regression: Estimation, Variable Selection and Beyond. arXiv:2401.04535.
- Jinyuan Chang, Zhao Ding, Yuling Jiao, Ruoxuan Li and Jerry Zhijian Yang (2024). Deep conditional distribution learning via conditional Föllmer flow. arXiv:2402.01460.
- Zhao Ding, Yuling Jiao, Xiliang Lu, Jerry Zhijian Yang and Cheng Yuan (2023). Sampling via Föllmer Flow. arXiv:2311.03660.
- Zhao Ding, Junjun Huang, Yuling Jiao, Xiliang Lu and Jerry Zhijian Yang (2020). Robust decoding from binary measurements with cardinality constraint least squares. *In press with Communications in Computational Physics*.
- Mo Chen, Zhao Ding, Yuling Jiao, Xiliang Lu, Peiying Wu and Jerry Zhijian Yang (2023). Convergence analysis of PINNs with Over-parametrization. In press with *Communications in Computational Physics*.

EXPERIENCE

- **Teaching Assistant, Wuhan University, 2021**

Numerical tutorials in MATLAB for “Numerical Linear Algebra”.

Project page: github.com/burning489/2021_autumn_numerical_linear_algebra

- **Member of Projects, Wuhan University & Huawei, 2020-2024**

- ▶ **Machine Learning Library**

Develop SVD, PCA, LDA and ARMA, with performance comparable to (partially better than) scikit-learn and statsmodels.

- ▶ **Vector Statistical Library**

Develop 1st-4th original & central SUM and MOM statistical functions.

- ▶ **MindX Models**

Implement of FNO & PINO (operator networks) in native MindSpore.

- ▶ **Math Function Library with High Precision**

Develop interval algorithms with arbitrary precision, built upon mpfr library, in object oriented style, for testing basic math functions at any precision.

- ▶ **Derivative Constrained Path Fitting**

Develop B-spline fitting algorithm under 1st-3rd derivative constraints.

- ▶ **Sparse Matrix Solver**

Design the architecture for sparse Cholesky decomposition and develop the symbol factorization part. Reach comparable performance compared to C library CHOLMOD.

- **Invited Talks**

- ▶ “Sampling via Föllmer Flow” at the student chapter of the 21st China Society for Industrial and Applied Mathematics (CSIAM) conference, 2023.

- ▶ “ODE-based Sampling and Generative Models” at the student chapter of the 17th East Asia Section for Industrial and Applied Mathematics (EASIAM) conference, 2024.