Zeyi Xu

Department of Mathematics, University of California, Irvine

zeyix1@uci.edu | Google Scholar | Homepage

Research Interests

Optimization for data science and machine learning: a unified framework for acceleration, adaptivity, and preconditioning (mirror descent) in first-order methods, built on continuous-time dynamics and Lyapunov analysis, with applications to computational optimal transport, Wasserstein gradient flows, and generative modeling.

Education

- **University of California, Irvine** — *Sep 2022 – Expected Jun 2027*
  Ph.D. in Mathematics, Advisor: Professor Long Chen — Irvine, CA, United States
- **Fudan University** — *Sep 2018 – Jun 2022*
  B.S. in Mathematics, with honors — Shanghai, China

Publications and Preprints

J=Journal, S=Submitted/Preprint, C=Conference

[J.1] Long Chen and **Zeyi Xu**. **HNAG^{++}: An Accelerated Gradient Method with a Refined Asymptotic Rate for Strongly Convex Optimization**. *Journal of Optimization Theory and Applications*, vol. 211, article 30, 2026. DOI: 10.1007/s10957-026-03131-x. arXiv: 2510.16680.

[J.2] Yaxin Yu, Long Chen, and **Zeyi Xu**. **Deterministic Adam-Inspired Methods with Accelerated Convergence Rate**. *Computers & Mathematics with Applications*, to appear. arXiv: 2604.08742.

[S.1] Long Chen and **Zeyi Xu**. **Acceleration of Generalized Conditional Gradient Methods**. Preprint, 2026. arXiv: 2610.25473.

[S.2] Long Chen and **Zeyi Xu**. **Accelerating Sinkhorn for Entropy-Regularized Optimal Transport**. Submitted, 2026. arXiv: 2605.30267.

[S.3] Long Chen and **Zeyi Xu**. **Adaptive Accelerated Mirror Descent in Primal and Dual Spaces**. Submitted, 2026. arXiv: 2606.02787.

[S.4] Long Chen, Hao Luo, Jingrong Wei, **Zeyi Xu**, and Yuan Yao. **Accelerated Mirror Descent Method through Variable and Operator Splitting**. Submitted, 2026. arXiv: 2601.19038.

[S.5] Long Chen and **Zeyi Xu**. **Adaptive Accelerated Gradient Descent Methods for Convex Optimization**. Preprint, 2026. arXiv: 2601.19013.

[C.1] Yunling Zheng, **Zeyi Xu**, Fanghui Xue, Biao Yang, Jiancheng Lyu, Shuai Zhang, Yingyong Qi, and Jack Xin. **AFIDAF: Alternating Fourier and Image Domain Adaptive Filters as an Efficient Alternative to Attention in ViTs**. In *International Symposium on Visual Computing (ISVC)*, pp. 17–30, Springer, 2024.

Talks and Presentations

- **Upcoming: Accelerating Structured First-Order Methods: From Sinkhorn's Algorithm to Conditional Gradient** — *Nov 2026*
  Minisymposium talk, SIAM Conference on Mathematics of Data Science (MDS26), Salt Lake City, UT
- **Upcoming: Accelerating Structured First-Order Methods: From Sinkhorn's Algorithm to Conditional Gradient** — *Nov 2026*
  Seminar talk, Applied & Computational Mathematics Seminar, UC Irvine
- **Accelerating Sinkhorn's Algorithm for Entropy-Regularized Optimal Transport** — *Apr 2026*
  Contributed talk, Southern California Applied Mathematics Symposium (SOCAMS)
- **Adaptive Accelerated Gradient Descent for Convex Optimization** — *Apr 2025*
  Contributed talk, Southern California Applied Mathematics Symposium (SOCAMS)

Honors and Awards

- **Howard Tucker Memorial Fellowship,** Department of Mathematics, UC Irvine — *2022*
- **First Prize Scholarship,** Huatai Securities, Fudan University — *2021*
- **National Scholarship (top 0.2% nationwide),** Ministry of Education, China — *2019*

Teaching Experience

- **Teaching Assistant, Department of Mathematics** — *Spring 2023 – Present*
  University of California, Irvine
  - **Graduate:** Math 290C Methods in Applied Mathematics (Spring 2025, Spring 2026)
  - **Upper division:** Math 130A Probability I (Fall 2024, Winter 2026); Math 105A Numerical Analysis I (Summer 2025); Math 105B Numerical Analysis II (Summer 2023)
  - **Lower division:** Math 2B Calculus II (Fall 2025); Math 2D Multivariable Calculus I (Fall 2023, Winter 2024, Spring 2024); Math 2E Multivariable Calculus II (Spring 2023); Math 3D Elementary Differential Equations (Summer 2025)
- **Mentor, Directed Reading Program in Mathematical Machine Learning (Math 199)** — *Fall 2024*
  University of California, Irvine
  - Mentored undergraduate students through reading and discussion, ending with a joint final presentation

Professional Service

- **Referee:** *Advances in Computational Mathematics* — *2026*