Shaocong Ma | Curriculum Vitae

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Education & Training

❖ **Postdoctoral Associate** 2024–present
University of Maryland, College Park
Advisor: Prof. Heng Huang

❖ **Ph.D. in Electrical and Computer Engineering** 2019–2024
University of Utah
Advisor: Prof. Yi Zhou

❖ **M.A. in Statistics** 2017–2019
University of California, Santa Barbara

❖ **B.S. in Statistics** 2013–2017
Sichuan University

Academic & Research Experiences

❖ **Research Internship**, Lawrence Livermore National Laboratory May 2022–Aug. 2022
Advisor: Dr. Bhavya Kailkhura, Dr. James Diffenderfer

- Implemented graph-based physics-informed neural networks (PINNs) for computational fluid dynamics (CFDs).

❖ **Research Assistant**, University of Utah Aug. 2019–May 2024
Advisor: Prof. Yi Zhou

- Explored robust and efficient reinforcement learning (RL) and stochastic optimization theory.

Preprint & Submission

[1] **Shaocong Ma** and Heng Huang. "Hyper-Octant Zeroth-Order Optimization: Fine-Tuning Quantized LLMs on the Positive Orthant Manifold". Submitted to ICML. 2026.

[2] **Shaocong Ma**, Chenhui Xu, Jinjun Xiong, and Heng Huang. "A Multi-Fidelity Mixture-of-Expert Framework Integrating PDE Solvers and Neural Operators for Computational Fluid Dynamics". Submitted to ICML. 2026.

[3] Ziyi Chen, **Shaocong Ma**, and Heng Huang. "Zeroth-Order Algorithm with the Best Direction". Submitted to ICML. 2026.

Publications

[4] **Shaocong Ma**, Peiran Yu, and Heng Huang. "New Hybrid Fine-Tuning Paradigm for LLMs: Algorithm Design and Convergence Analysis Framework". In: *International Conference on Learning Representations (ICLR)*. 2026.

[5] **Shaocong Ma** and Heng Huang. "Riemannian Zeroth-Order Gradient Estimation with Structure-Preserving Metrics for Geodesically Incomplete Manifolds". In: *International Conference on Learning Representations (ICLR)*. 2026.

[6] **Shaocong Ma** and Heng Huang. "On the Optimal Construction of Unbiased Gradient Estimators for Zeroth-Order Optimization". In: *Advances in Neural Information Processing Systems (NeurIPS)* (2025). *NeurIPS 2025 Spotlight*.

[7] **Shaocong Ma** and Heng Huang. "Robust Reinforcement Learning in Finance: Modeling Market Impact with Elliptic Uncertainty Sets". In: *Advances in Neural Information Processing Systems (NeurIPS)* (2025).

[8] **Shaocong Ma** and Heng Huang. "Revisiting Zeroth-Order Optimization: Minimum-Variance Two-Point Estimators and Directionally Aligned Perturbations". In: *International Conference on Learning Representations (ICLR)* (2025). *ICLR 2025 Spotlight*.

[9] **Shaocong Ma**, Ziyi Chen, Yi Zhou, and Heng Huang. "Rectified Robust Policy Optimization for Model-Uncertain Constrained Reinforcement Learning without Strong Duality". In: *Transactions on Machine Learning Research (TMLR)* (2025).

[10] **Shaocong Ma**, James Diffenderfer, Bhavya Kailkhura, et al. "Deep learning of PDE correction and mesh adaption without automatic differentiation". In: *Machine Learning* (2025).

[11] Yi Zhou and **Shaocong Ma**. "Stochastic Optimization Methods for Policy Evaluation in Reinforcement Learning". In: *Foundations and Trends in Optimization* (2024).

[12] **Shaocong Ma**, Ziyi Chen, Shaofeng Zou, and Yi Zhou. "Decentralized Robust V-learning for Solving Markov Games with Model Uncertainty". In: *The Journal of Machine Learning Research (JMLR)* (2023).

[13] Ziyi Chen, **Shaocong Ma**, and Yi Zhou. "Accelerated proximal alternating gradient-descent-ascent for nonconvex minimax machine learning". In: *2022 IEEE International Symposium on Information Theory (ISIT)* (2022).

[14] Ziyi Chen, **Shaocong Ma**, and Yi Zhou. "Finding correlated equilibrium of constrained Markov game: A primal-dual approach". In: *Advances in Neural Information Processing Systems (NeurIPS)* (2022).

[15] **Shaocong Ma**, Ziyi Chen, Yi Zhou, Kaiyi Ji, and Yingbin Liang. "Data sampling affects the complexity of online sgd over dependent data". In: *Uncertainty in Artificial Intelligence (UAI)* (2022).

[16] Ziyi Chen, **Shaocong Ma**, and Yi Zhou. "Sample efficient stochastic policy extragradient algorithm for zero-sum markov game". In: *International Conference on Learning Representations (ICLR)* (2021).

[17] **Shaocong Ma**, Ziyi Chen, Yi Zhou, and Shaofeng Zou. "Greedy-GQ with Variance Reduction: Finite-time Analysis and Improved Complexity". In: *International Conference on Learning Representations (ICLR)* (2020).

[18] **Shaocong Ma** and Yi Zhou. "Understanding the impact of model incoherence on convergence of incremental SGD with random reshuffle". In: *International Conference on Machine Learning (ICML)* (2020).

[19] **Shaocong Ma**, Yi Zhou, and Shaofeng Zou. "Variance-reduced off-policy TDC learning: Non-asymptotic convergence analysis". In: *Advances in Neural Information Processing Systems (NeurIPS)* (2020).

Honors & Awards

- ❖ NeurIPS 2025, Top Reviewer Award — 2025
- ❖ NeurIPS 2025, Spotlight (top 3% of submissions) — 2025
- ❖ ICLR 2025, Spotlight (top 5% of submissions) — 2025
- ❖ AISTATS 2025, Best Reviewer Award — 2025
- ❖ Graduate 1st Place at University of Utah — 2024
- ❖ Invited Monograph Contributor, Now Publishers (Foundations and Trends in Optimization) — 2024
- ❖ Invited Participant (fully funded), NSF-Simons MoDL Annual Meeting, Simons Foundation, New York — 2023
- ❖ Excellence Scholarship, The College of Mathematics, Sichuan University — 2013–2017
- ❖ Second Prize, Chinese Mathematics Competitions for College Students, Sichuan Province Division — 2014

Successful Grant Writing Experiences

- Advanced AI Framework to Improve Understanding and Prediction of Wildland Fire 2026–2028
  Awarded by NSF-RISE, **$1,856,577**.
- A Real-World Test Bed for Post-Market Surveillance and Stress Testing of AI-Enabled Imaging Tools 2025–2027
  Awarded by FDA, **$1.2M**.
- Ultrascale Machine Learning to Empower Discovery in Alzheimers Disease Biobanks 2026–2031
  Recommended, NIH center grant, **$15M**.
- Other grant writing experience for NSF MFAI, NSF GCR, NSF PCL, NSF SLES, NSF/NIH SCH, NIH R01s.

Teaching Experiences

- **Coteach**, University of Maryland, College Park 2024–2025
  - CMSC422: Introduction to Machine Learning
- **Teaching Assistant**, University of Utah 2020–2021
  - ECE 3500: Fundamentals of Signals and Systems
- **Teaching Assistant**, University of California, Santa Barbara 2018–2019
  - PSTAT 5A: Statistics; PSTAT 5LS: Statistics for Life Science; PSTAT 109: Statistics for Economics;
  - PSTAT 172A: Actuarial Statistics; PSTAT 175: Survival Analysis

Professional Services

- **Conference Reviewer**: ICML; ICLR; NeurIPS; IEEE BigData; IJCAI; UAI; AAAI; AISTATS; RLC.
- **Journal Reviewer**: Transactions on Machine Learning Research (TMLR); IEEE Transactions on Signal Processing (TSP); IEEE Transactions on Networking (ToN); IEEE Transactions on Emerging Topics in Computational Intelligence (TETCI); Scientific Reports; Numerical Algorithms; Nonlinear Dynamics; European Journal of Control.
- **Workshop Reviewer**: ICLR Blogpost.