Lexiao Lai

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Employment

The University of Hong Kong — Hong Kong, China
Assistant Professor, Department of Mathematics — July 2024 -

Interests

Nonconvex optimization, applied semialgebraic geometry, data science

Education

Columbia University in the City of New York — New York, U.S.
Ph.D. in Operations Research [thesis] — Sept. 2019 - May 2024
Advisor: Cédric Josz

The University of Hong Kong — Hong Kong, China
B.Sc. in Mathematics — Sept. 2015 - June 2019

Publications

1. Phase transitions in phase-only compressed sensing (with Junren Chen and Arian Maleki), *IEEE International Symposium on Information Theory (ISIT)*, 2025 [preprint] [proceeding]
2. Nonsmooth rank-one symmetric matrix factorization landscape (with Cédric Josz), *Optimization Letters*, 2025 [preprint] [journal]
3. Sufficient conditions for instability of the subgradient method with constant step size (with Cédric Josz), *SIAM Journal on Optimization*, 2024 [preprint] [journal]
4. Convergence of the momentum method for semialgebraic functions with locally Lipschitz gradients (with Cédric Josz and Xiaopeng Li), *SIAM Journal on Optimization*, 2023 [preprint] [journal doi]
5. Global stability of first-order methods for coercive tame functions (with Cédric Josz), *Mathematical Programming, 2023* [preprint] [journal]
6. Lyapunov stability of the subgradient method with constant step size (with Cédric Josz), *Mathematical Programming, 2023* [preprint] [journal]
7. Nonsmooth rank-one matrix factorization landscape (with Cédric Josz), *Optimization Letters*, 2022 [preprint] [journal doi]
8. Time-dependent surveillance-evasion games (with Elliot Cartee, Qianli Song, and Alexander Vladimirsky), *IEEE Conference on Decision and Control (CDC)*, 2019 [preprint] [proceeding]

Preprints

1. Non-convex self-concordant functions: Practical algorithms and complexity analysis (with Donald Goldfarb, Tianyi Lin, and Jiayu Zhang), 2025 [preprint]
2. On the diameter of subgradient sequences in o-minimal structures (with Mingzhi Song), 2025 [preprint]
3. Proximal random reshuffling under local Lipschitz continuity (with Cédric Josz and Xiaopeng Li), 2024 [preprint]

Talks

1. International Conference on Scientific Machine Learning, Hong Kong, December 3rd 2025, *On the diameter of subgradient sequences in o-minimal structures*
2. International Conference on Scientific Machine Learning, Hong Kong, December 3rd 2024, *Proximal random reshuffling under local Lipschitz continuity*
3. 14th Triennial International Conference of APORS, Hangzhou, November 17th 2024, *Proximal random reshuffling under local Lipschitz continuity*
4. International Symposium on Mathematical Programming, Montréal, July 23rd 2024, *Global stability of first-order methods for coercive tame functions*
5. IMS Young Mathematical Scientists Forum – Applied Mathematics, Singapore, January 9th 2024, *Global stability of first-order methods for coercive tame functions*
6. INFORMS Annual Meeting, Phoenix, October 17th 2023, *Global stability of first-order methods for coercive tame functions*
7. UCSD Optimization and Data Science Seminar, San Diego, October 4th 2023, *Global stability of first-order methods for coercive tame functions*

8. International Congress on Industrial and Applied Mathematics, Tokyo, August 24th 2023, *Global stability of first-order methods for coercive tame functions*
9. SIAM Conference on Optimization, Seattle, June 1st 2023, *Global stability of first-order methods with constant step size for coercive tame functions*
10. CUHK SEEM Department Seminar, Hong Kong, December 8th 2022, *Lyapunov stability of the subgradient method with constant step size*
11. HKU Optimization and Machine Learning Seminar, Hong Kong, December 6th 2022, *Lyapunov stability of the subgradient method with constant step size*
12. PGMODAYS, Paris, November 29th 2022, *Lyapunov stability of the subgradient method with constant step size*
13. INFORMS Annual Meeting, Indianapolis, October 17th 2022, *Lyapunov stability of the subgradient method with constant step size*

Grants

1. ECS grant 27301425, *A study of first-order methods for structured nonconvex optimization problems in data science*, HKD778,276, Jan. 2026 - Dec. 2028

Awards & Honours

- Columbia IEOR Department Fellowship 2019
- Walter Brown Memorial Prizes in Mathematics, HKU 2019
- Doris Chen Undergraduate Project Prize, HKU 2018
- Liu Ming-Chit Prize in Mathematics, HKU 2018
- Alan John Allis Prize in Mathematics, HKU 2016,2017
- Dean's Honours List, HKU 2016,2017,2019
- HKSAR Government Scholarship, HKU 2015-2019

Teaching Experience

As course instructor:
HKU: Operations Research I Spring 2025

As teaching assistant:
Columbia:
- Optimization Methods & Models Spring 2024
- Convex Optimization Spring 2023
- Optimization Methods & Models for Financial Engineering Fall 2023

HKU: Linear Algebra I Spring 2019

Student Mentering

PhD students:
- Kaiwei Yang (2025-)
- Mingzhi Song (2024-)

On thesis defending committee:
- Zimeng Wang (HKU)
- Tan Zhang (HKU)

Undergraduate students:
- Zesheng Cai (HKU)
- Shiyang Chen (HKU)
- Pinxi Gong (HKU)
- Tiansheng Li (HKU)
- Qi Peng (HKU)
- Han Zheng (HKU)

Service

Session chair:
- *Optimization Theory and Algorithms I*, APORS Youth Forum, 2025
- *Recent advances in first-order methods*, International Conference on Continuous Optimization (ICCOPT), 2025
- HKMS-HKSIAM Joint Young Scholars Symposium, 2024
- *First-order methods and large-scale optimization*, International Symposium on Mathematical Programming (ISMP), 2024
- *Structured and tame optimization*, INFORMS Annual Meeting, 2023

Reviewer:
- AISTATS

- Applied Mathematics and Optimization
- Computational Optimization and Applications
- Journal of Optimization Theory and Applications
- Mathematics of Operations Research

Internship

TCL Corporate Research (Hong Kong) Company Limited — Hong Kong, China
Research Intern, AI Research Lab — May-Sept. 2021

Computer Skills

Python, MATLAB, LaTeX