

ZIKAI XIONG

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Updated on September 11, 2026 (click [here](#) for the latest version)

ACADEMIC APPOINTMENTS

Northwestern University, Evanston, IL

July 2026 – present

ASSISTANT PROFESSOR

Department of Industrial Engineering and Management Sciences

Georgia Institute of Technology, Atlanta, GA

July 2025 – July 2026

POSTDOCTORAL FELLOW

School of Industrial and Systems Engineering

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA

2020 – 2025

PH.D. IN OPERATIONS RESEARCH

Advisor: Prof. Robert M. Freund

Fudan University, Shanghai, China

2016 – 2020

B.S. IN MATHEMATICS AND APPLIED MATHEMATICS

RESEARCH INTERESTS

Twin interests in theoretical foundations and computational practice of optimization, and applications in operations research, data science and machine learning/AI.

PUBLICATIONS (alphabetical authorship marked with *)

PAPERS PUBLISHED OR UNDER REVIEW AT JOURNALS

- J1 Zikai Xiong. High-Probability Polynomial-Time Complexity of Restarted PDHG for Linear Programming. [arXiv] [pdf]
To appear in *Mathematics of Operations Research*, 2026
- J2 Zikai Xiong. Accessible Complexity Bounds for Restarted PDHG on Linear Programs with a Unique Optimizer. [link] [pdf]
Mathematics of Operations Research, 2026
 - Winner, 2025 INFORMS Optimization Society Student Paper Prize
- J3 Zikai Xiong and Robert M. Freund. Computational Guarantees for Restarted PDHG for LP based on “Limiting Error Ratios” and LP Sharpness. [link] [pdf]
Mathematical Programming, 2026
 - Honorable Mention, 2024 INFORMS Optimization Society Student Paper Prize
- J4 *Dongdong Ge, Chengwenjian Wang, Zikai Xiong and Yinyu Ye. From an Interior Point to a Corner Point: Smart Crossover. [link] [pdf]
INFORMS Journal on Computing, 2025
- J5 Zikai Xiong and Robert M. Freund. Using Taylor-Approximated Gradients to Improve the Frank-Wolfe Method for Empirical Risk Minimization. [link] [pdf] [additional results]
SIAM Journal on Optimization, 2024
- J6 Zikai Xiong, Renjie Xu, Yanwei Xu and Yimin Wei. Low-rank Traffic Matrix Completion with Marginal Information. [link] [pdf]
Journal of Computational and Applied Mathematics, 2022
- J7 Zikai Xiong and Robert M. Freund. Symmetry-dependence in Rounding of a Convex Body. [arXiv] [pdf]
Under preparation for submission, 2026

- J8 *Katya Scheinberg and Zikai Xiong. Function-free Optimization via Comparison Oracles. [arXiv] [pdf]
Under review, 2026
- J9 Zhenwei Lin, Zikai Xiong, Dongdong Ge and Yinyu Ye. A Practical GPU-Enhanced Matrix-Free Primal-Dual Method for Large-Scale Conic Programs. [arXiv] [pdf] [additional results] [software]
Under revision, 2025
- J10 *Jiacheng Guo, Bo Jiang, Zikai Xiong and Nanxi Zhang. Two Sides of “Hidden City Ticketing”: Analysis of a Choice-Based Network Revenue Management Model. [link]
Under revision for resubmission, 2025
- J11 Zikai Xiong and Robert M. Freund. The Role of Level-Set Geometry on the Performance of PDHG for Conic Linear Optimization. [arXiv] [pdf]
Under revision for resubmission, 2024
- Finalist, 2024 George Nicholson Student Paper Competition
 - Honorable Mention, 2024 MIT ORC Best Student Paper Competition

PAPERS PUBLISHED AT CONFERENCES

- C1 Zikai Xiong, Niccolò Dalmaso, Shubham Sharma, Freddy Lecue, Daniele Magazzeni, Vamsi K. Potluru, Tucker Balch and Manuela Veloso. Fair Wasserstein Coresets. [link] [pdf]
Preliminary version appeared in NeurIPS 2023 Workshop SyntheticData4ML (Oral Presentation) Neural Information Processing Systems (NeurIPS), 2024
- C2 Zikai Xiong, Niccolò Dalmaso, Alan Mishler, Vamsi Potluru, Tucker Balch and Manuela Veloso. Fair-WASP: Fast and Optimal Fair Wasserstein Pre-processing. [link] [pdf]
AAAI Conference on Artificial Intelligence (AAAI), 2024
- C3 Zhengqi Gao, Fan-Keng Sun, Mingran Yang, Sucheng Ren, Zikai Xiong, et al. Learning from Multiple Annotator Noisy Labels via Sample-wise Label Fusion. [link] [pdf]
European Conference on Computer Vision (ECCV), 2022
- C4 *Dongdong Ge, Haoyue Wang, Zikai Xiong and Yinyu Ye. Interior-Point Methods Strike Back: Solving the Wasserstein Barycenter Problem. [link] [pdf]
Neural Information Processing Systems (NeurIPS), 2019

DISSERTATION

- D1 Zikai Xiong. New Theory and New Practical Methods for Solving Large-Scale Linear and Conic Optimization [link] [pdf], 2025
- Second Place, 2025 George B. Dantzig Dissertation Award

TECHNICAL REPORTS

- T1 Zhenwei Lin, Zikai Xiong, Dongdong Ge and Yinyu Ye. A Technical Note on the Implementation and Use of PDCS [arXiv] [pdf], 2026
- T2 Zikai Xiong and Robert M. Freund. On the Relation Between LP Sharpness and Limiting Error Ratio and Complexity Implications for Restarted PDHG. [arXiv] [pdf], 2023

PATENT APPLICATIONS

- P1 Niccolò Dalmaso, Zikai Xiong, Vamsi Krishna Potluru, Tucker Richard Balch and Manuela Veloso. Method and System for Generating Fair Synthetic Representative Data via Optimal Transport. [link]
U.S. Patent Application Publication No. US 2025/0181999 A1, pending, 2025.
- P2 Niccolò Dalmaso, Zikai Xiong, Alan Mishler, Vamsi Krishna Potluru, Tucker Richard Balch and Manuela Veloso. Method and System for Pre-processing Data for Algorithmic Fairness via Optimal Transport. [link]
U.S. Patent Application Publication No. US 2025/0173389 A1, pending, 2025.

WORK EXPERIENCE

Georgia Institute of Technology, Postdoctoral Fellow, Atlanta, GA

July 2025 - July 2026

Supervisor: Katya Scheinberg

- Function-free optimization with comparison oracles.

MIT Sloan School of Management, Research Assistant, Cambridge, MA

2020 - 2025

Supervisor: Robert M. Freund

- Modern optimization methods for huge-scale operations research and machine learning problems.

J.P.Morgan Chase AI Research, Research Associate Intern, New York, NY

Summer 2023

Managers: Niccolò Dalmaso, Vamsi Potluru and Manuela Veloso

- Algorithmic fairness in machine learning and large-scale optimization.

Shanghai University of Finance and Economics (SUFU), Research Assistant, Shanghai, China *2019 - 2020*

Supervisors: Yinyu Ye (Stanford), Dongdong Ge

- Optimization for operations research and machine learning.
- Developed and improved algorithms for the commercial solver COPT.

TEACHING

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Computing in Optimization and Statistics (15.S60)

Winter 2024

- Instructor for the advanced optimization sessions of a computing course during MIT January Independent Activities Period. The duties include designing lectures, creating teaching materials, and giving lectures.

Introduction to Mathematical Programming (15.081)

Fall 2022 and Fall 2023

- Head TA for MIT's doctoral introductory optimization course (for ORC and other MIT PhD programs).
- Teaching score: 6.8/7 (Fall 2023) and 6.6/7 (Fall 2022).
- Voted as the "Best TA" in the ORC Superlatives events (in 2023 and 2024).

The Analytics Edge (15.071)

Spring 2022

- TA for MBA course in business analytics at Sloan School of Management.
- Teaching score: 6.4/7.

Online Course in Data Science and Business Analytics

Summer 2022

- Designed course materials for a new online course in data science and business analytics.
- Supervisor: Robert M. Freund

GUEST LECTURE

- Large-Scale Linear Programming Using the Primal-Dual Hybrid Gradient Method
MIT, Cambridge, MA

November 2025

TALKS

FUNCTION-FREE OPTIMIZATION VIA COMPARISON ORACLES

- Modeling and Optimization: Theory and Applications (MOPTA), Lehigh University, PA *August 2026*
- Foundations of Computational Mathematics (poster), University of Vienna, Austria *July 2026*
- Third Derivative-Free Optimization Symposium, Université de Montréal *June 2026*
- SIAM Conference on Optimization (OP26), Edinburgh, United Kingdom *June 2026*
- INFORMS Optimization Society Conference, Atlanta, GA *March 2026*

PDCS: A PRIMAL-DUAL LARGE-SCALE CONIC PROGRAMMING SOLVER WITH GPU ENHANCEMENTS

- INFORMS Annual Meeting, Atlanta, GA, *October 2025*
- cuOPT Team, NVIDIA, virtual *July 2025*
- Computational Robotics Group Seminar, Harvard University, Cambridge, MA *May 2025*

NEW THEORY AND NEW PRACTICAL METHODS FOR SOLVING LARGE-SCALE LINEAR AND CONIC OPTIMIZATION

- INFORMS Annual Meeting (Dantzig Dissertation Competition Session), Atlanta, GA *October 2025*
- PhD Thesis Defense, MIT, Cambridge, MA *May 2025*

THEORETICAL FOUNDATIONS AND PRACTICAL IMPROVEMENTS FOR LARGE-SCALE LINEAR PROGRAMMING

- Data Science Lab Seminar, MIT, Cambridge, MA *April 2025*
- Georgia Institute of Technology, Atlanta, GA *April 2025*
- Columbia University, New York, NY *February 2025*
- University of Chicago, Chicago, IL *February 2025*
- Cornell University, Ithaca, NY *January 2025*
- Northwestern University, Evanston, IL *January 2025*
- University of British Columbia, Vancouver, BC, Canada *January 2025*
- NC State University, Raleigh, NC *January 2025*
- Chinese University of Hong Kong (CUHK), Hong Kong *January 2025*
- Hong Kong University of Science and Technology (HKUST), Hong Kong *December 2024*

LEVEL-SET GEOMETRY AND IMPROVING THE PERFORMANCE OF PDHG FOR LINEAR OPTIMIZATION

- INFORMS Nicholson Student Paper Competition, Seattle, WA *October 2024*
- INFORMS Annual Meeting, Seattle, WA *October 2024*
- Cornell ORIE Young Researchers Workshop, Ithaca, NY *October 2024*
- OM Seminar, MIT, Cambridge, MA *September 2024*

THEORETICAL COMPLEXITY OF PDHG FOR LINEAR PROGRAMS WITH UNIQUE OPTIMA

- INFORMS Annual Meeting (Optimization Society Award Session), Atlanta, GA *October 2025*
- ARC Colloquium, Georgia Tech, Atlanta, GA *September 2025*
- Modeling and Optimization: Theory and Applications (MOPTA), Lehigh University, PA *August 2024*
- International Symposium on Mathematical Programming (ISMP), Montréal, Canada *July 2024*
- Conference in honor of Yinyu Ye's retirement, Shanghai, China *July 2024*

IMPROVING THE GEOMETRY OF (CONIC) LINEAR OPTIMIZATION PROBLEMS FOR THE PRIMAL-DUAL HYBRID GRADIENT METHOD

- Modeling and Optimization: Theory and Applications (MOPTA), Lehigh University, PA *August 2024*
- INFORMS Optimization Society Conference, Houston, TX *March 2024*
- LIDS Conference, MIT, Cambridge, MA *February 2024*
- INFORMS Annual Meeting, Phoenix, AZ *October 2023*
- ORC Student Seminar, MIT, Cambridge, MA *October 2023*
- Shanghai University of Finance and Economics, Shanghai, China *September 2023*
- Workshop on Modern Continuous Optimization, Cambridge, MA *August 2023*

GEOMETRIC CONDITION MEASURES FOR THE PRIMAL-DUAL HYBRID GRADIENT METHOD FOR LINEAR PROGRAMMING

- SIAM Conference on Optimization (SIOPT), Seattle, WA *June 2023*
- ORC Student Seminar, MIT, Cambridge, MA *March 2023*

USING TAYLOR-APPROXIMATED GRADIENTS TO IMPROVE THE FRANK-WOLFE METHOD FOR EMPIRICAL RISK MINIMIZATION

- INFORMS Annual Meeting, Indianapolis, IN *October 2022*
- ORC Student Seminar, MIT, Cambridge, MA *October 2022*
- International Conference on Continuous Optimization (ICCOPT), Lehigh University, Bethlehem, PA *July 2022*

FROM AN INTERIOR POINT TO A CORNER POINT: SMART CROSSOVER

- INFORMS Annual Meeting, Indianapolis, IN *October 2022*

INTERIOR-POINT METHODS STRIKE BACK: SOLVING THE WASSERSTEIN BARYCENTER PROBLEM

- INFORMS Annual Meeting, Seattle, WA *October 2019*
- "Heart of the Machine" Seminar, Shanghai, China *October 2019*

COMPUTING THE WASSERSTEIN BARYCENTER EFFICIENTLY: A STRUCTURED LINEAR SYSTEM AND CUSTOMIZED ALGORITHMS

- Seminar of New Advances in Theory and Application of ADMM, Shanghai, China

March 2019

SERVICE

REFEREE for

- Operations Research
- Mathematics of Operations Research
- SIAM Journal on Optimization
- Mathematical Programming
- INFORMS Journal on Computing
- Journal of Optimization Theory and Applications
- Tutorials in Operations Research
- Optimization Letters
- Journal of Machine Learning Research
- AAAI Conference on Artificial Intelligence (AAAI)
- International Conference on Machine Learning (ICML)
- Conference on Neural Information Processing Systems (NeurIPS)

SESSION (Co-)CHAIR for

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| • INFORMS Annual Meeting, San Francisco, CA | <i>October 2026</i> |
| • Modeling and Optimization: Theory and Applications (MOPTA), Bethlehem, PA | <i>August 2026</i> |
| • INFORMS Optimization Society Conference, Atlanta, GA | <i>March 2026</i> |
| • INFORMS Annual Meeting, Seattle, WA | <i>October 2024</i> |
| • International Symposium on Mathematical Programming (ISMP), Montréal, Canada | <i>July 2024</i> |
| • INFORMS Optimization Society Conference, Houston, TX | <i>March 2024</i> |
| • INFORMS Annual Meeting, Indianapolis, IN | <i>October 2022</i> |

AWARDS AND HONORS

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| • NSF Travel Award for Young Researchers, Foundations of Computational Mathematics (FoCM) | <i>2026</i> |
| • Winner, INFORMS Optimization Society Student Paper Prize | <i>2025</i> |
| • Second Place, George B. Dantzig Dissertation Award | <i>2025</i> |
| • Finalist, George Nicholson Student Paper Competition | <i>2024</i> |
| • Honorable Mention, INFORMS Optimization Society Student Paper Prize | <i>2024</i> |
| • Honorable Mention, MIT ORC Best Student Paper Competition | <i>2024</i> |
| • First Prize, MIT ORC Common Experience Deep Learning Challenge | <i>2021</i> |
| • INFORMS Optimization Society Conference Travel Award | <i>2024</i> |
| • SIAM Travel Award | <i>2021</i> |
| • MIT Graduate Student Council Travel Grant | <i>2022</i> |
| • Star Graduate Award, Fudan University | <i>2020</i> |
| • Outstanding Graduate of Shanghai City | <i>2020</i> |
| • Top Outstanding Undergraduate Student Award, Fudan University | <i>2019</i> |

OTHER

Programming languages: Julia, Python, MATLAB, R

Personal interests: Hiking, skiing, traveling, and cooking Sichuan cuisine.

REFERENCES

KATYA SCHEINBERG, Georgia Institute of Technology (Postdoctoral Supervisor)
Coca-Cola Foundation Chair and Professor
H. Milton Stewart School of Industrial and Systems Engineering
✉ katya.scheinberg@isye.gatech.edu

ROBERT M FREUND, MIT (Ph.D. Advisor)
Theresa Seley Professor in Management Science
Sloan School of Management
✉ rfreund@mit.edu

YINYU YE, Stanford University
K. T. Li Professor of Engineering
Department of Management Science and Engineering
✉ yyye@stanford.edu

HAIHAO LU, MIT
Assistant Professor, Operations Research and Statistics
Sloan School of Management
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SWATI GUPTA, MIT
Associate Professor, Operations Research and Statistics
Sloan School of Management
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