

Baoyu Zhou

CONTACT INFORMATION

BYENG 324
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RESEARCH INTERESTS

Large-scale Continuous Optimization, Constrained Stochastic Optimization, Nonsmooth Optimization, Derivative-Free Optimization, Optimization Methods for Machine Learning

ACADEMIC POSITIONS

Assistant Professor July 2024 – present
Arizona State University, Tempe, AZ
School of Computing and Augmented Intelligence

Postdoctoral Research Fellow Aug. 2023 – Apr. 2024
University of Michigan, Ann Arbor, MI
Department of Industrial and Operations Engineering

Principal Researcher Aug. 2022 – July 2023
University of Chicago, Chicago, IL
Booth School of Business

EDUCATION

Lehigh University
Ph.D. in Industrial & Systems Engineering Aug. 2018 – May 2022
Advisor: Frank E. Curtis
Doctoral Committee: Frank E. Curtis (Lehigh), Albert S. Berahas (U of Michigan), Jorge Nocedal (Northwestern), Daniel P. Robinson (Lehigh), and Luis Nunes Vicente (Lehigh)
M.S. in Industrial & Systems Engineering Aug. 2016 – May 2018

Shanghai Jiao Tong University
B.S.E. in Mechanical Engineering Aug. 2012 – Aug. 2016

The Chinese University of Hong Kong
Undergraduate Exchange Student Jan. 2015 – Apr. 2015

RESEARCH EXPERIENCE

Research Assistant Aug. 2018 – May 2022
Lehigh University, Bethlehem, PA
Department of Industrial & Systems Engineering

Research Intern May 2021 – Aug. 2021
Facebook, Inc., New York, NY
Facebook AI Research

Givens Associate May 2020 – Aug. 2020
Argonne National Laboratory, Lemont, IL
Mathematics and Computer Science Division

Visiting Research Assistant June 2017 – Aug. 2017
Northwestern University, Evanston, IL
Department of Industrial Engineering and Management Sciences

PUBLISHED JOURNAL ARTICLES

[1] F. E. Curtis, D. P. Robinson, and **B. Zhou***. Sequential Quadratic Optimization for Stochastic

All publications with “” sign on my name indicates the author list is arranged in alphabetical order.

tic Optimization with Deterministic Nonlinear Inequality and Equality Constraints. arXiv 2302.14790, 2023. (to appear in *SIAM Journal on Optimization*)

- [2] F. E. Curtis, D. P. Robinson, and **B. Zhou***. A Stochastic Inexact Sequential Quadratic Optimization Algorithm for Nonlinear Equality-Constrained Optimization. *INFORMS Journal on Optimization*, <https://doi.org/10.1287/ijoo.2022.0008>, 2024.
- [3] A. S. Berahas, J. Shi, Z. Yi, and **B. Zhou***. Accelerating Stochastic Sequential Quadratic Programming for Equality Constrained Optimization using Predictive Variance Reduction. *Computational Optimization and Applications*, 86:79-116, 2023.
- [4] A. S. Berahas, F. E. Curtis, and **B. Zhou***. Limited-Memory BFGS with Displacement Aggregation. *Mathematical Programming*, 194(1):121-157, 2022.
- [5] J. Larson, M. Menickelly, and **B. Zhou***. Manifold Sampling for Optimizing Nonsmooth Nonconvex Compositions. *SIAM Journal on Optimization*, 31(4):2638-2664, 2021.
- [6] A. S. Berahas, F. E. Curtis, D. P. Robinson, and **B. Zhou***. Sequential Quadratic Optimization for Nonlinear Equality Constrained Stochastic Optimization. *SIAM Journal on Optimization*, 31(2):1352-1379, 2021.
- [7] F. E. Curtis, D. P. Robinson, and **B. Zhou***. A Self-Correcting Variable-Metric Algorithm Framework for Nonsmooth Optimization. *IMA Journal of Numerical Analysis*, 40(2):1154-1187, 2020.

PUBLISHED CONFERENCE ARTICLES

- [8] J. C. N. Liang, H. Lu, and **B. Zhou***. Online Ad Procurement in Non-stationary Autobidding Worlds. *Thirty-seventh Conference on Neural Information Processing Systems*, 2023.

WORKING PAPERS

- [9] J. R. Birge, H. Lu, and **B. Zhou***. On the Convergence of L-shaped Algorithms for Two-Stage Stochastic Programming. arXiv 2309.01244, 2023.
- [10] A. S. Berahas, M. Xie, and **B. Zhou***. A Sequential Quadratic Programming Method with High Probability Complexity Bounds for Nonlinear Equality Constrained Stochastic Optimization. arXiv 2301.00477, 2023.
- [11] A. Defazio, **B. Zhou**, and L. Xiao. Grad-GradaGrad? A Non-Monotone Adaptive Stochastic Gradient Method. arXiv 2206.06900, 2022.
- [12] A. S. Berahas, R. Bollapragada, and **B. Zhou***. An Adaptive Sampling Sequential Quadratic Programming Method for Equality Constrained Stochastic Optimization. arXiv 2206.00712, 2022.

DISSERTATIONS

- [13] **B. Zhou**. Methods for Large Scale Nonlinear Optimization and Equality Constrained Stochastic Optimization. Ph.D. Thesis, Department of Industrial & Systems Engineering, Lehigh University, Bethlehem, PA, USA, 2022.
- [14] **B. Zhou**. Quadratic Optimization for Nonsmooth Optimization Algorithms: Thoery and Numerical Experiments. Master Thesis, Department of Industrial & Systems Engineering, Lehigh University, Bethlehem, PA, USA, 2018.

TECHNICAL REPORTS

- [15] H. Huang, H. Feng, **B. Zhou**, E. Pan, and L. Xi. Multi-Objective Cell Formation Problem Considering Mixed-Type Data of Parts. *Technical Report* (in Chinese), 2016.

PRESENTATIONS

- [1] Baoyu Zhou. New Understandings on L-shaped Methods for Two-Stage Stochastic Programming. *INFORMS Optimization Society Conference, Houston, TX, USA*, March 2024.
- [2] Baoyu Zhou. Next Generation Algorithms for Constrained Stochastic Optimization. *School of Computing and Augmented Intelligence, Arizona State University, Tempe, AZ, USA*, January 2024.
- [3] Baoyu Zhou. Next Generation Algorithms for Constrained Stochastic Optimization. *Department of Economics and Business, Colorado School of Mines, Golden, CO, USA*, January 2024.
- [4] Baoyu Zhou. Next Generation Algorithms for Constrained Stochastic Optimization. *Operations Research and Industrial Engineering Program, The University of Texas at Austin, Austin, TX, USA*, January 2024.
- [5] Baoyu Zhou. Next Generation Algorithms for Constrained Stochastic Optimization. *Department of Mathematics, Florida State University, Tallahassee, FL, USA*, January 2024.
- [6] Baoyu Zhou. New Understandings on L-shaped Methods for Two-Stage Stochastic Programming. *INFORMS Annual Meeting, Phoenix, AZ, USA*, October 2023.
- [7] Baoyu Zhou. New Understandings on L-shaped Methods for Two-Stage Stochastic Programming. *Cornell Young Researcher Workshop, Ithaca, NY, USA*, October 2023. (poster)
- [8] Baoyu Zhou. Methods for Constrained Stochastic Optimization: Theory and Practice. *Argonne National Laboratory, Lemont, IL, USA*, September 2023.
- [9] Baoyu Zhou. Inexact Bundle Methods for Two-Stage Stochastic Programming. *MOPTA Conference, Bethlehem, PA, USA*, August 2023.
- [10] Baoyu Zhou. Inexact Bundle Methods for Two-Stage Stochastic Programming. *School of Mathematics, The University of Edinburgh, Edinburgh, Scotland*, July 2023.
- [11] Baoyu Zhou. Inexact Bundle Methods for Two-Stage Stochastic Programming. *SIAM Conference on Optimization, Seattle, WA, USA*, June 2023.
- [12] Baoyu Zhou. SQP Methods for Deterministically Constrained Stochastic Optimization. *Department of Systems and Industrial Engineering, The University of Arizona, Tucson, AZ, USA*, February 2023.
- [13] Baoyu Zhou. SQP Methods for Inequality Constrained Stochastic Optimization. *INFORMS Annual Meeting, Indianapolis, IN, USA*, October 2022.
- [14] Baoyu Zhou. SQP Methods for Deterministically Constrained Stochastic Optimization. *FutureBAProf Workshop, The University of Iowa, Iowa City, IA, USA*, August 2022.
- [15] Baoyu Zhou. SQP Methods for Inequality Constrained Stochastic Optimization. *International Conference on Continuous Optimization, Bethlehem, PA, USA*, July 2022.
- [16] Baoyu Zhou. Fast, Efficient and Practical Algorithms for Nonlinear Optimization. *Department of Industrial, Manufacturing and Systems Engineering, Texas Tech University, Lubbock, TX, USA*, December 2021.
- [17] Baoyu Zhou. An Inexact Sequential Quadratic Method For Nonlinear Equality Constrained Stochastic Optimization. *INFORMS Annual Meeting, Anaheim, CA, USA*, October 2021.
- [18] Baoyu Zhou. Manifold Sampling for Optimizing Nonsmooth Nonconvex Compositions. *MOPTA Conference, Bethlehem, PA, USA*, August 2021.
- [19] Baoyu Zhou. SQP for Nonlinear Equality Constrained Stochastic Optimization. *MOPTA Conference, Bethlehem, PA, USA*, August 2021.
- [20] Baoyu Zhou. SQP Methods for Equality Constrained Stochastic Optimization. *SIAM Conference on Optimization, Spokane, WA, USA*, July 2021.
- [21] Baoyu Zhou. Manifold Sampling for Optimizing Nonsmooth Nonconvex Compositions. *SIAM Conference on Computational Science and Engineering, Fort Worth, TX, USA*, March 2021.

- [22] Baoyu Zhou. Manifold Sampling for Optimizing Nonconvex Piecewise-Smooth Compositions. *INFORMS Annual Meeting, National Harbor, MD, USA*, November 2020.
- [23] Baoyu Zhou. Limited-Memory BFGS with Displacement Aggregation. *INFORMS Annual Meeting, Seattle, WA, USA*, October 2019.
- [24] Baoyu Zhou. Limited-Memory BFGS with Displacement Aggregation. *MOPTA Conference, Bethlehem, PA, USA*, August 2019.

TEACHING EXPERIENCE

Guest Lecturer

University of Michigan, Ann Arbor, MI

IOE 691: Advanced Computational Optimization

Winter 2024

Bootcamp Organizer & Instructor

Lehigh University, Bethlehem, PA

Aug. 2021

Teaching Assistant Mentor

Shanghai Jiao Tong University, Shanghai, China

Sept. 2014 – Aug. 2016

Undergraduate Teaching Assistant

Shanghai Jiao Tong University, Shanghai, China

VV156: Honors Calculus II

Fall 2013, Spring 2014, Fall 2015

VM240: Intro to Dynamics and Vibrations

Summer 2015

PROFESSIONAL EXPERIENCE

Cost Engineer Intern

Fiat Chrysler Automobiles, Shanghai, China

Mar. 2016 – May 2016

Technical Assistant Intern

Shenyang Blower Works Group Corporation, Shenyang, China

Aug. 2015 – Sept. 2015

HONORS & AWARDS

Elizabeth V. Stout Dissertation Award, Lehigh University

2022

SIAM Student Travel Award

2021

Van Hoesen Family Best Publication Award, Lehigh ISE Department

2021

P.C. Rossin Doctoral Fellow, Lehigh University

2021

Ph.D. Student of the Year, Lehigh ISE Department

2021

Lehigh University Fellowship

2018 – 2019

Outstanding Freshman Scholarship, Shanghai Jiao Tong University

2012 – 2016

Outstanding Academic Scholarship, Shanghai Jiao Tong University

2015

MENTORSHIP EXPERIENCE

Ph.D. Student Advisees

- Yang Zeng (Arizona State University)

2024 – present

Other Ph.D. Students

- Jinwen Yang (University of Chicago)

2023 – present

Advisor: Haihao (Sean) Lu

- Jiahao Shi (University of Michigan)

2021 – present

Advisor: Albert S. Berahas

Other Undergraduate Students

- Zihong Yi (University of Michigan) 2021 – 2022
Advisor: Albert S. Berahas
 Now: Ph.D. student at Carnegie Mellon University

ACADEMIC SERVICE

Professional Affiliations

- Society for Industrial and Applied Mathematics (SIAM) 2021 – present
- Institute for Operations Research and Management Sciences (INFORMS) 2018 – present

Professional Community Service

- Reviewer, INFORMS DEI Best Student Paper Award 2024
- Vice President, Lehigh University INFORMS Student Chapter 2020 – 2021

Organized Conference Sessions

- ICCOPT Conference
 - *Advances in Nonlinear Optimization*, Bethlehem, PA, USA, July 2022.
 - *Large-Scale, Nonlinear, and Stochastic Optimization IV*, Bethlehem, PA, USA, July 2022.
- INFORMS Annual Meeting
 - *Advances in Nonlinear, Stochastic, and Constrained Optimization*, Seattle, WA, USA, October 2024.
 - *Recent Advances in Nonlinear and Stochastic Optimization*, Indianapolis, IN, USA, October 2022.
 - *Nonlinear and Stochastic Optimization*, Indianapolis, IN, USA, October 2022.
 - *Advances in Nonlinear and Stochastic Optimization (I-II)*, Anaheim, CA, USA, October 2021.
 - *Optimization in Quantum Computing and vice versa I*, Anaheim, CA, USA, October 2021.
- INFORMS Optimization Society Conference
 - *Methods for Large-Scale Nonlinear and Stochastic Optimization (I-III)*, Houston, TX, USA, March 2024.
- MOPTA Conference
 - *Nonlinear and Stochastic Optimization Algorithms*, Bethlehem, PA, USA, August 2021.
 - *Algorithms for Derivative-Free Optimization*, Bethlehem, PA, USA, August 2021.
- SIAM Conference on Optimization
 - *Recent Advances in Large-Scale Nonlinear Optimization I-II (Sessions I-IV)*, Seattle, WA, USA, May 2023.

Journals Reviewed for (# of articles reviewed)

- Computational Optimization and Applications (5)
- EURO Journal on Computational Optimization (1)
- IEEE Transactions on Automatic Control (1)
- IEEE Transactions on Network Science and Engineering (1)
- IEEE Transactions on Neural Networks and Learning Systems (4)
- IEEE Transactions on Pattern Analysis and Machine Intelligence (1)
- IMA Journal of Numerical Analysis (1)
- Journal of Machine Learning Research (1)
- Journal of Optimization Theory and Applications (1)

- Journal of Scientific Computing (2)
- Machine Learning (1)
- Management Science (2)
- Mathematical Methods of Operations Research (1)
- Mathematical Programming (2)
- Mathematical Programming Computation (1)
- Mathematics of Computation (1)
- Optimization Methods and Software (3)
- SIAM Journal on Mathematics of Data Science (1)
- SIAM Journal on Matrix Analysis and Applications (1)
- SIAM Journal on Optimization (4)

Conferences Reviewed for (# of articles reviewed)

- When Machine Learning meets Dynamical Systems: Theory and Applications (MLmDS) Workshop, AAAI 2023 (1)
- Optimization for Machine Learning (OPT) Workshop, NeurIPS 2022 (3)
- New Frontiers in Federated Learning (NFFL) Workshop, NeurIPS 2021 (3)
- Optimization for Machine Learning (OPT) Workshop, NeurIPS 2021 (3)
- Optimization for Machine Learning (OPT) Workshop, NeurIPS 2020 (4)

COURSES

Convex Analysis; Planning & Scheduling in Manufacturing & Services; Optimization Models & Applications; Nonlinear Optimization; Random Processes & Applications; Intro to Math Optimization; Real Analysis I; Discrete Optimization; Computational Methods in Optimization; Dynamic Programming; Applied Operations Research; Optimization Methods in Machine Learning; Mining of Large Datasets; Quantum Computing for Optimization

COMPUTER SKILLS

Programming Language: C/C++, Julia, MATLAB, Python, R

Software: AMPL, LINGO, Mathematica, \LaTeX

Solver: CPLEX, MOSEK, GUROBI, SEDUMI