

# SHIXUAN ZHANG

## CONTACT

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Address: 4031 Emerging Technologies Bldg, 3131 TAMU, College Station, TX 77843

Phone: +1 (979) 458-2362

Email: shixuan.zhang@tamu.edu

## PROFESSIONAL EXPERIENCES

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- Assistant Professor, Wm Michael Barnes '64 Department of Industrial & Systems Engineering, Texas A&M University 2023–Present
- Postdoctoral Fellow, Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University 2022–2023
- Visiting Scholar, Sloan School of Management, Massachusetts Institute of Technology 2022

## EDUCATION

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- Ph.D. in Operations Research, Georgia Institute of Technology, Atlanta, Georgia 2017–2022
- B.S. in Mathematics and Physics, Tsinghua University, Beijing 2013–2017

## PUBLICATIONS AND PREPRINTS

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(Corresponding author is marked by c. Works with alphabetical author ranking are indicated by  $\alpha$ .)

- $\alpha$  Grigoriy Blekherman, Jesús A. De Loera, Luze Xu, and **Shixuan Zhang**. "Semigroups of Integer Points in Convex Cones." arXiv preprint arXiv:2504.15537 (2025). Accepted in Algebra & Number Theory (2025).
- $\alpha$  **Shixuan Zhang** and Suhang Zhong. "Moment Relaxations for Data-Driven Wasserstein Distributionally Robust Optimization." arXiv preprint arXiv:2505.19278 (2025).
- $\alpha$  Grigoriy Blekherman, Rainer Sinn, Mauricio Velasco, and **Shixuan Zhang**. "Spurious local minima in nonconvex sum-of-squares optimization." arXiv preprint arXiv:2411.02208 (2024).
- **Shixuan Zhang** and Xu Andy Sun. "On Distributionally Robust Multistage Convex Optimization: New Algorithms and Complexity Analysis." arXiv preprint arXiv:2010.06759 (2020).
- **Shixuan Zhang<sup>c</sup>** and Xu Andy Sun. "On distributionally robust multistage convex optimization: Data-driven models and performance." INFORMS Journal on Optimization (2025).
- $\alpha$  Jesús A. De Loera, Brittney Marsters, Luze Xu<sup>c</sup>, and **Shixuan Zhang**. "Integer points in arbitrary convex cones: the case of the PSD and SOC cones." Mathematical Programming (2025): 1-25.
- Ignacio Aravena<sup>c</sup>, Daniel K. Molzahn, **Shixuan Zhang**, Cosmin G. Petra, Frank E. Curtis, Shenyinying Tu, Andreas Wächter et al. "Recent developments in security-constrained AC optimal power flow: Overview of Challenge 1 in the ARPA-E Grid Optimization Competition." Operations research 71, no. 6 (2023): 1997-2014.
- Amin Gholami, Kaizhao Sun, **Shixuan Zhang**, and Xu Andy Sun<sup>c</sup>. "An ADMM-Based Distributed Optimization Method for Solving Security-Constrained Alternating Current Optimal Power Flow." Operations Research 71, no. 6 (2023): 2045-2060.
- Christian Füllner<sup>c</sup>, **Shixuan Zhang**, Steffen Rebennack, Andy Sun. "Stochastic Dual Dynamic Integer Programming (SDDiP)." In Encyclopedia of Optimization, pp. 1-11. Cham: Springer International Publishing, 2022.

- **Shixuan Zhang** and Xu Andy Sun<sup>c</sup>. "Stochastic Dual Dynamic Programming for Multistage Stochastic Mixed-Integer Nonlinear Optimization." *Mathematical Programming* 196, no. 1 (2022): 935-985.
- **Shixuan Zhang**, Sheng Liu, Tianhu Deng<sup>c</sup>, and Zuo-Jun Max Shen. "Transient-State Natural Gas Transmission in Gunbarrel Pipeline Networks." *INFORMS Journal on Computing* 32, no. 3 (2020): 697-713.
- Tianhu Deng, Yong Liang<sup>c</sup>, **Shixuan Zhang**, Jingze Ren, and Shuyi Zheng. "A Dynamic Programming Approach to Power Consumption Minimization in Gunbarrel Natural Gas Networks with Nonidentical Compressor Units." *INFORMS Journal on Computing* 31, no. 3 (2019): 593-611.

## RESEARCH GRANTS

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- Project: Collaborative Research: Dynamic Grid Optimization under High Renewable Penetration: Multistage Algorithms and Stability Augmentation 2025-2027  
Sponsor: National Science Foundation (NSF) and US Department of Energy  
Role: PI, Lead Institution  
Co-PI: Xin Chen (Texas A&M University), Bai Cui (Iowa State University)  
Amount: \$449,999 with Personal Share \$149,999
- Project: Learn to Adapt to Wind Energy Variability in Smart Grid 2025  
Sponsor: Texas A&M University Collaborative Seed Grant  
Role: PI with Co-PI Xin Chen  
Amount: \$45,000 with Personal Share: \$22,500

## HONORS AND AWARDS

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- Outstanding Contribution in Reviewing for *Operations Research Letters* 2022
- Honorable Mention for INFORMS Optimization Society Best Student Paper Prize 2021
- Prize winning team (GMI-GO) in the ARPA-E Grid Optimization Competition 2019 & 2021

## TEACHING

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- ISEN 689: Convex Geometry and Optimization Fall 2025  
Enrollment: 18
- ISEN 320: Operations Research I Spring 2025  
Enrollment: 30
- ISEN 320: Operations Research I Fall 2024  
Enrollment: 39
- ISEN 623: Nonlinear and Dynamic Programming Spring 2024  
Enrollment: 17
- ISEN 320: Operations Research I Fall 2023  
Enrollment: 29

## PROFESSIONAL MEMBERSHIPS

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- Member of *Society for Industrial and Applied Mathematics* (SIAM) 2021-Present
- Member of *Institute for Operations Research and the Management Sciences* (INFORMS) 2018-Present

## INVITED PRESENTATIONS

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- Title: Moment Relaxations for Wasserstein Distributionally Robust Optimization  
Date: October 26, 2025  
Format: Oral Presentation  
Event: INFORMS Annual Meeting  
Location: Atlanta, GA
- Title: Spurious Local Minima in Nonconvex Sum-of-Squares Optimization  
Date: July 23, 2025  
Format: Oral Presentation  
Event: International Conference on Continuous Optimization (ICCOPT)  
Location: Los Angeles, CA
- Title: Spurious Local Minima in Nonconvex Sum-of-Squares Optimization  
Date: July 7, 2025  
Format: Oral Presentation  
Event: SIAM Conference on Applied Algebraic Geometry  
Location: Madison, WI
- Title: Finite Generation of Integer Points in Convex Cones  
Date: April 25, 2025  
Format: Oral Presentation  
Event: Algebra & Combinatorics Seminar, Texas A&M University Department of Mathematics  
Location: College Station, TX
- Title: Moment Relaxations for Wasserstein Distributionally Robust Optimization  
Date: October 22, 2024  
Format: Oral Presentation  
Event: INFORMS Annual Meeting  
Location: Seattle, WA
- Title: Local Minima in Nonconvex Sum-of-Squares Optimization via Syzygies  
Date: October 12, 2024  
Format: Oral Presentation  
Event: SIAM Texas-Louisiana Section Meeting  
Location: Waco, TX
- Title: Local Minima in Nonconvex Sum-of-Squares Optimization via Syzygies  
Date: August 2, 2024  
Format: Oral Presentation  
Event: Effective Methods in Algebraic Geometry (MEGA) Conference  
Location: Leipzig, Germany
- Title: Local Minima in Nonconvex Sum-of-Squares Optimization via Syzygies  
Date: July 23, 2024  
Format: Oral Presentation  
Event: International Symposium on Mathematical Programming  
Location: Montreal, Canada
- Title: Spurious Local Minima in Nonconvex Sum-of-Squares Optimization  
Date: May 7, 2024

Format: Oral Presentation

Event: Mathematics of Data and Decisions (MADD) Seminar, University of California, Davis

Location: Davis, CA

- Title: Certification of Sums of Squares via Low-Rank Optimization

Date: March 24, 2024

Format: Oral Presentation

Event: INFORMS Optimization Society Conference

Location: Houston, TX

- Title: Certification of Sums of Squares via Low-Rank Optimization

Date: November 17, 2023

Format: Oral Presentation

Event: Algebra & Combinatorics Seminar, Texas A&M University Department of Mathematics

Location: Houston, TX

- Title: Burer-Monteiro Method for Low-Rank Sum-of-Squares Certification

Date: October 15, 2023

Format: Oral Presentation

Event: INFORMS Annual Meeting

Location: Phoenix, AZ

- Title: Dual Dynamic Programming for Data-Driven Distributionally Robust Multistage Convex Optimization

Date: July 27, 2023

Format: Oral Presentation

Event: International Conference on Stochastic Programming

Location: Davis, CA

- Title: Burer-Monteiro Method for Low-Rank Sum-of-Squares Certification

Date: March 19, 2023

Format: Oral Presentation

Event: AMS Southeastern Sectional Meeting

Location: Atlanta, GA

- Title: Dual Dynamic Programming for Data-Driven Distributionally Robust Multistage Convex Optimization

Date: October 18, 2022

Format: Oral Presentation

Event: INFORMS Annual Meeting

Location: Indianapolis, IN

- Title: Dual Dynamic Programming for Data-Driven Distributionally Robust Multistage Convex Optimization

Date: July 26, 2022

Format: Oral Presentation

Event: International Conference on Continuous Optimization

Location: Bethlehem, PA

- Title: Sum of Squares and Optimal Power Flow Problems

Date: June 27, 2022

Format: Poster Presentation

Event: Combinatorial, Computational, and Applied Algebraic Geometry

Location: Seattle, WA

- Title: Dual Dynamic Programming for Data-Driven Distributionally Robust Multistage Convex Optimization

Date: March 14, 2022

Format: Oral Presentation

Event: INFORMS Optimization Society Conference

Location: Greenville, SC

- Title: Data-Driven Multistage Decision Making: Stochastic and Distributionally Robust Models, Algorithms, and Complexity Analysis

Date: October 6, 2021

Format: Poster Presentation

Event: Cornell Young Researchers Workshop

Location: Ithaca, NY

- Title: Iteration Complexity for Stochastic Dual Dynamic Programming Algorithms

Date: September 19, 2021

Format: Oral Presentation

Event: SIAM Southeastern Atlantic Section Meeting

Location: Virtual

- Title: Complexity for Multistage Distributionally Robust Dual Dynamic Programming

Date: July 22, 2021

Format: Oral Presentation

Event: SIAM Conference on Optimization

Location: Virtual

- Title: Generalized Conjugacy Method for Nonconvex Stochastic Optimization in Power Systems

Date: October 12, 2020

Format: Oral Presentation

Event: INFORMS Annual Meeting

Location: Virtual

- Title: Stochastic Dual Dynamic Programming Algorithm for Multistage Stochastic Mixed-integer Nonlinear Optimization

Date: May 18, 2020

Format: Oral Presentation

Event: MIP Workshop

Location: Virtual

- Title: Stochastic Dual Dynamic Programming Algorithm for Nonconvex Multistage Optimization Problems

Date: October 23, 2019

Format: Oral Presentation

Event: INFORMS Annual Meeting

Location: Seattle, WA

- Title: New Algorithms for Solving the Natural Gas Transient Scheduling Problem

Date: May 19, 2019

Format: Oral Presentation

Event: IISE Annual Meeting

Location: Orlando, FL

- Title: A Minor Perspective on Rank Constrained Optimization

Date: November 6, 2018

Format: Oral Presentation

Event: INFORMS Annual Meeting

Location: Phoenix, AZ

## ACADEMIC SERVICES

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### Journal Reviews (counts since 2022)

- Mathematical Programming (3)
- Operations Research (3)
- European Journal of Operational Research (2)
- Journal of Optimization Theory and Applications (1)
- Journal of Global Optimization (4)
- Operations Research Letters (3)
- IEEE Transactions on Power Systems (19)
- IEEE Transactions on Control of Network Systems (2)

### Grant Reviews

- Panel Reviewer, NSF-CMMI 2024

### Thesis Committees

- Kevin Shu (Georgia Institute of Technology) 2024
- Hyuk Park (University of Illinois Urbana-Champaign) 2024

### College and Departmental Services

- College of Engineering Junior Faculty Advisory Council 2025-Present
- Departmental Faculty Search Committee 2024-2025
- Departmental Graduate Affairs Committee 2023-2024

### Academic Conference Services

- Session Chair, *Global Optimization Methods in Robust and Stochastic Programming* in INFORMS Annual Meeting 2025
- Session Chair, *Mitigating Distributional Ambiguity in Stochastic Programming* in INFORMS Annual Meeting 2024
- Session co-Chair, *Theory, Algorithms, and Applications of Multistage Optimization* in INFORMS Annual Meeting 2022