

Can Li

Assistant Professor

Davidson School of Chemical Engineering, Purdue University
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EDUCATION

Carnegie Mellon University

August 2016-May 2021

Ph.D. in Chemical Engineering

- Research advisor: Prof. Ignacio E. Grossmann
- Thesis: Algorithms for Stochastic Mixed-Integer Nonlinear Programming and Long Term Optimization of Electric Power Systems

Tsinghua University

August 2012-July 2016

B.Eng. in Chemical Engineering

APPOINTMENTS

Davidson School of Chemical Engineering, Purdue University, IN

Assistant Professor, June 2022-Present

Department of Mathematics and Industrial Engineering, Polytechnique Montreal

Post-doctoral Researcher, June 2021-June 2022, Advisor: Prof. Andrea Lodi

Mathematics and Computer Science Division, Argonne National Laboratory, Lemont, IL

Givens Associate, 2020-August 2020, Supervisor: Dr. Kibaek Kim

ExxonMobil Upstream Research Company, Spring, TX

Research intern, May 2018-August 2018, Supervisor: Dr. Kevin Furman

HONORS AND AWARDS

- Ralph W. and Grace M. Showalter Research Trust Grant, 2024
- ACS PRF Doctoral New Investigator Award, 2024
- Amazon Research Award, 2023
- Winner of Air Liquide Scientific Challenge, 2023
- CAST Division Student Presentation Award, 3rd place, 2021

CURRENT RESEARCH FUNDING

- Privacy-Preserving Distributed Optimization for Cooperative Solutions in Fair Utility-Sharing Problems. Source of support: Air Liquide. Role: PI. Amount: \$620,408 (contract) \$58,000 (prize). Date: 2024-2029.
- Design and Analysis of Sustainable Supply Chains Using Optimization and Large Language Models. Source of support: Amazon Research Award. Role: PI. Amount: \$50,000 (unrestricted cash), \$40,000 (AWS cloud computing credit). Date: 2024-2025
- Collaborative Proposal: Machine Learning Aided Global Optimization of MINLP. Source of support: ONR. Role: Lead PI. Co-PI: Andrea Lodi. Amount: \$348,076 (Li's share). Date: 2024-2027.
- EAGER: CET: Optimization Methods to Control Multiple Steady States for Electrochemical Production of Net-Zero Fuels. Source of support: NSF CBET. Role: co-PI. PI: Brian Tackett. Amount: \$120,696 (Li's share). Date: 2024-2026

- Machine Learning-aided Safety Hazard Detection and Identification. Source of support: Purdue P2SAC. Role: PI. Amount: \$80,000. Date: 2023-2025
- Multi-Scale Design and Operations of Electrochemical Reactor for CO₂ Conversion Using Physics-Informed Machine Learning. Source of support: ACS PRF. Role: PI. Amount: \$110,000. Date: 2024-2026
- Analysis of Single-Cell RNA Datasets for Immune Stem Cells Using Large Language Models. Source of support: Showalter Trust. Role: PI. Amount: \$75,000. Date: 2024-2025
- eMB: Explainable and Physics-Informed Machine Learning for Cell Typing via a Modern Optimization Lens. Source of support: NSF-DMS. Role: PI. Amount: \$376,162.

RESEARCH MENTORING

Postdoctoral Researchers

- Gonzalo Esteban Constante Flores 2023-present
- Kaiyu Cao 2022-2024
- Chi Zhang 2022-2023

PhDs

- Sai Madhukiran Kompalli 2023-present
- Akshdeep Singh Ahluwalia 2023-present
- Yen-Chun Lu 2022-present
- Hao Chen 2022-present
- Asha Ramanujam 2021-present

INVITED SEMINAR

- [1] Can Li (2024). Applications of Machine Learning in Solving and Explaining Optimization Models. MOP seminar at Amazon. Invited by Dr. Arash Haddadan
- [2] Can Li (2024). Applications of Machine Learning in Solving and Explaining Optimization Models. Department Seminar at Integrated Systems Engineering, the Ohio State University. Invited by Prof. Antonio Conejo
- [3] Can Li (2023). Machine Learning for Global Optimization, YinzOR conference at Carnegie Mellon University. Invited by Tepper School of Business
- [4] Can Li (2023). Machine Learning for Combinatorial and Global Optimization, PSE Seminar at University of Minnesota. Invited by Prof. Qi Zhang and Prof. Prodromos Daoutidis
- [5] Can Li (2022). Machine Learning for Combinatorial and Global Optimization, LANS seminar at Argonne National Laboratory. Invited by Dr. Kibaek Kim
- [6] Can Li (2022). Algorithms and Software for Two-stage Stochastic Mixed-integer Nonlinear Programs. Group meeting at Imperial College London and Manchester University. Invited by Prof. Antonio Del Rio Chanona and Prof. Dongda Zhang
- [7] Can Li (2022). Algorithms and Software for Two-stage Stochastic Mixed-integer Nonlinear Programs. Coffee talk at Polytechnique Montreal. Invited by Prof. Andrea Lodi
- [8] Can Li (2021). Decision-making under uncertainty through mathematical programming: Optimization of sustainable energy systems design and operation. Davidson School of Chemical Engineering, Purdue University.
- [9] Can Li (2021). Algorithms and Software for Two-stage Stochastic Mixed-integer Nonlinear Programs. Los Alamos National Laboratory, invited by Dr. Harsha Nagarajan
- [10] Can Li (2018). On Solving Stochastic Mixed-integer Nonlinear Programs. Department of Chemical Engineering, Tsinghua University, invited by Prof. Yushan Zhu

REVIEW SERVICE

Journal Reviews

- Optimization and Engineering

- Computers & Chemical Engineering
- Journal of Global Optimization
- SIAM Journal on Optimization
- Mathematical Programming
- INFORMS Journal on Computing
- International Journal of Electrical Power and Energy Systems
- Computers and Electrical Engineering
- SN Operations Research Forum
- AIChE Journal
- Industrial & Engineering Chemistry Research
- IEEE Transactions on Control Systems Technology
- ACS Sustainable Chemistry & Engineering
- Transportation Research Part E
- Networks and Spatial Economics
- European Journal of Operational Research

Research Grant Reviews

- NSF CBET
- NFRFE

CONFERENCE ORGANIZATION

- Session Chair, INFORMS Annual Meeting, 2024
- Session Chair, INFORMS Annual Meeting, 2023
- Session Chair, SIAM Conference on Optimization, 2023
- Session Chair, ICCOPT, 2022
- Session Chair, INFORMS Annual Meeting, 2021
- Cluster Chair, INFORMS Annual Meeting, 2020
- Session Chair, INFORMS Annual Meeting, 2020
- Session Chair, XV ICSP conference, Trondheim, 2019.

PUBLICATIONS

- [1] Chen, H., Flores, G. E. C., & Li, C. (2024). Physics-informed neural networks with hard linear equality constraints. *Computers & Chemical Engineering*, 108764.
- [2] Papageorgiou, D. J., Kronqvist, J., Ramanujam, A., Kor, J., Kim, Y., & Li, C. (2024). Solution polishing via path relinking for continuous black-box optimization. *Optimization Letters*, 1-42.
- [3] Ramanujam, A., ConstanteFlores, G. E., & Li, C. (2023). Distributed manufacturing for electrified chemical processes in a microgrid. *AIChE Journal*, e18265.
- [4] Cho, S., Li, C., & Grossmann, I. E. (2022). Recent advances and challenges in optimization models for expansion planning of power systems and reliability optimization. *Computers & Chemical Engineering*, 107924.
- [5] Chang, Y., Syahirah, R., Wang, X., Jin, G., Torregrosa-Allen, S., Elzey, B. D., ... & Bao, X. (2022). Engineering chimeric antigen receptor neutrophils from human pluripotent stem cells for targeted cancer immunotherapy. *Cell reports*, 40(3), 111128.
- [6] Torres, J. J., Li, C., Apap, R. M., & Grossmann, I. E. (2022). A Review on the Performance of Linear and Mixed Integer Two-Stage Stochastic Programming Software. *Algorithms*, 15(4), 103.
- [7] Li, C., Conejo, A. J., Siirola, J. D., & Grossmann, I. E. (2021). On representative day selection for capacity expansion planning of power systems under extreme operating conditions. *International Journal of Electrical Power & Energy Systems*, 107697.
- [8] Peng, Z., Li, C., Grossmann, I. E., Kwon, K., Ko, S., Shin, J., & Feng, Y. (2021). Shale gas field development planning under production profile uncertainty. *AIChE Journal*, e17439.
- [9] Peng, Z., Li, C., Grossmann, I. E., Kwon, K., Ko, S., Shin, J., & Feng, Y. (2021). Multiperiod design and planning model of shale gas field development. *AIChE Journal*, 67(8), e17195.

- [10] Li, C., Conejo, A. J., Liu, P., Omell, B. P., Sirola, J. D., & Grossmann, I. E. (2021). Mixed-integer linear programming models and algorithms for generation and transmission expansion planning of power systems. *European Journal of Operational Research*.
- [11] Li, C., & Grossmann, I. E. (2021). A review of stochastic programming methods for optimization of process systems under uncertainty. *Front. Chem. Eng*, 2, 1-20.
- [12] Perez, H. D., Hubbs, C. D., Li, C., & Grossmann, I. E. (2021). Algorithmic Approaches to Inventory Management Optimization. *Processes*, 9(1), 102.
- [13] Li, C., Bernal, D.E., Furman, K.C., Duran, M.A. and Grossmann, I.E., 2020. Sample average approximation for stochastic nonconvex mixed integer nonlinear programming via outer-approximation. *Optimization and Engineering*, pp.1-29.
- [14] Hubbs, C.D., Li, C., Sahinidis, N.V., Grossmann, I.E. and Wassick, J.M., 2020. A Deep Reinforcement Learning Approach for Chemical Production Scheduling. *Computers & Chemical Engineering*, p.106982.
- [15] Li, C., Eason, J.P., Drouven, M.G. and Grossmann, I.E., 2020. Shale gas pad development planning under price uncertainty. *AIChE Journal*, 66(6), p.e16933.
- [16] Li, C. and Grossmann, I.E., 2019. A generalized Benders decomposition-based branch and cut algorithm for two-stage stochastic programs with nonconvex constraints and mixed-binary first and second stage variables. *Journal of Global Optimization*, 75(2), pp.247-272.
- [17] Li, C. and Grossmann, I.E., 2019. A finite ϵ -convergence algorithm for two-stage stochastic convex nonlinear programs with mixed-binary first and second-stage variables. *Journal of Global Optimization*, 75(4), pp.921-947.
- [18] Lara, C.L., Bernal, D.E., Li, C. and Grossmann, I.E., 2019. Global optimization algorithm for multi-period design and planning of centralized and distributed manufacturing networks. *Computers & Chemical Engineering*, 127, pp.295-310.
- [19] Li, C. and Grossmann, I.E., 2018. An improved L-shaped method for two-stage convex 0-1 mixed integer nonlinear stochastic programs. *Computers & Chemical Engineering*, 112, pp.165-179.
- [20] Wang, H.* , Chen, X.* , Li, C.* , Liu, Y., Yang, F. and Wang, C., 2018. Sequence-based prediction of cysteine reactivity using machine learning. *Biochemistry*, 57(4), pp.451-460.

* = Co-1st-Author

TEACHING EXPERIENCE

- Statistical Modeling and Quality Enhancement (Fall 2022-2024)
- Computational Optimization (Spring 2024)