Can Li

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Last updated: December 15, 2024

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

- NSF CAREER Award, 2025
- 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.
- Reinforcement Learning for Multi-Period Design and Operation of the Blending Problem. Source of support: ExxonMobil. Role: PI. Amount: $149,726. Date:2024-2026 Date: 2024-2025
- CAREER: Novel Neural Network Architectures Inspired by Optimization Algorithms. Source of support: NSF CBET. Role: PI. Amount: $500,000. Date: 2025-2030.

RESEARCH MENTORING

Postdoctoral Researchers

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

PhDs

- Hsuan-Han Chiu 2024-present
- Piyush Sharma 2024-present
- Shraman Pal 2024-present
- 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). OptiChat: Explaining Optimization Problems Using Large Language Models. Seminar at Relational AI. Invited by Dr. Hector Perez.

[2] Can Li (2024). OptiChat: Explaining Optimization Problems Using Large Language Models. Seminar at Oracle. Invited by Dr. Andrew Vakhutinsky

[3] Can Li (2024). Applications of Machine Learning in Solving and Explaining Optimization Models. Applied Optimization Seminar at Hitachi Energy. Invited by Dr. Iiro Harjunkoski

[4] Can Li (2024). Applications of Machine Learning in Solving and Explaining Optimization Models. MOP seminar at Amazon. Invited by Dr. Arash Haddadan

[5] 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

[6] Can Li (2023). Machine Learning for Global Optimization, YinzOR conference at Carnegie Mellon University. Invited by Tepper School of Business

[7] 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

[8] Can Li (2022). Machine Learning for Combinatorial and Global Optimization, LANS seminar at Argonne National Laboratory. Invited by Dr. Kibaek Kim

[9] 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

[10] Can Li (2022). Algorithms and Software for Two-stage Stochastic Mixed-integer Nonlinear Programs. Coffee talk at Polytechnique Montreal. Invited by Prof. Andrea Lodi

[11] 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.

[12] Can Li (2021). Algorithms and Software for Two-stage Stochastic Mixed-integer Nonlinear Programs. Los Alamos National Laboratory, invited by Dr. Harsha Nagarajan

[13] 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

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

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., Constante-Flores, G. E., & Li, C. (2024). Diagnosing infeasible optimization problems using large language models. INFOR: Information Systems and Operational Research, 62(4), 573-587.

[2] Chen, H., Flores, G. E. C., & Li, C. (2024). Physics-informed neural networks with hard linear equality constraints. Computers & Chemical Engineering, 108764.

[3] 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.

[4] Ramanujam, A., ConstanteFlores, G. E., & Li, C. (2023). Distributed manufacturing for electrified chemical processes in a microgrid. AIChE Journal, e18265.

[5] 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.

[6] 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.

[7] 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.

[8] 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.

[9] 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.

[10] 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.

[11] Li, C., Conejo, A. J., Liu, P., Omell, B. P., Siirola, 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.

[12] 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.

[13] Perez, H. D., Hubbs, C. D., Li, C., & Grossmann, I. E. (2021). Algorithmic Approaches to Inventory Management Optimization. Processes, 9(1), 102.

[14] 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.

[15] 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.

[16] 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.

[17] 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.

[18] 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.

[19] 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.

[20] 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.

[21] 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)