

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

- Research advisor: Prof. Yushan Zhu, Prof. Chu Wang
- Thesis: Sequence-Based Prediction of Cysteine Reactivity Using Machine Learning

University of Wisconsin, Madison

August 2014-December 2014

Exchange Student, Department of Chemical and Biological Engineering

APPOINTMENTS

Davidson School of Chemical Engineering, Purdue University, IN

June 2022-

Assistant Professor

Research expertise: Stochastic Programming; Mixed-Integer Programming; Energy Systems

Argonne National Laboratory, Lemont, IL

May 2020-August 2020

Givens Associate at Mathematics and Computer Science Division

Supervisor: Dr. Kibaek Kim

- Decision rule-based algorithm for two-stage stochastic programs

ExxonMobil Upstream Research Company, Spring, TX

May 2018-August 2018

Research intern in Decision Support and Optimization team

Supervisor: Dr. Kevin Furman

- Feasibility detector for LNG ship scheduling problems

RESEARCH EXPERIENCE

Polytechnique Montreal

June 2021-June 2022

Post-doctoral Researcher, Department of Mathematics and Industrial Engineering
Andrea Lodi

Advisor: Prof.

- Develop machine learning methods for global optimization problems
- Develop first-order methods for solving semidefinite programming problems

Carnegie Mellon University

November 2016-May 2021

Research Assistant

Advisor: Prof. Ignacio E. Grossmann

- Decision-making under uncertainty: several new algorithms and software packages for solving stochastic mixed-integer nonlinear programming problems that are intractable by commercial solvers

- Energy systems: power systems infrastructure planning with high renewables penetration, shale gas development planning under uncertainty in natural gas price that leads to millions of dollar savings
- Data-driven methods: a deep reinforcement learning approach for chemical production scheduling

Peking University

Independent Researcher

October 2015-July 2016

Advisor: Prof. Chu Wang

- Gathered mass spectrometry data reflecting functional cysteine reactivity in proteomes.
- Developed a novel sequence-based feature-selection tool and a machine learning-based algorithm, sbPCR, for cysteine reactivity prediction

University of Washington, Seattle

Student Intern

July 2015-September 2015

Advisor: Prof. David Baker

- Computational protein design: used in-house software for *de novo* design of protein fibers
- Experimental work: expressed desired designs in *E.coli* and characterized them using experimental methods, such as Transmission Electron Microscopy (TEM) and mass spectrometry.

University of Wisconsin, Madison

Independent Researcher

August 2014-December 2014

Advisor: Prof. Christos T. Maravelias

- Chemical production scheduling: built three new continuous-time models for scheduling multistage batch process under utility constraints

TEACHING EXPERIENCE

CMU, Department of Chemical Engineering

Teaching Assistant

January 2017-present

- Designed and gave guest lectures, held office hours, designed and graded assignments and projects, instructed and supervised students in project work, lead student group discussions
- Courses: Chemical Process Systems Design, Process Systems Modeling, Advanced Process Systems Engineering

CMU, Eberly Center for Teaching Excellence & Educational Innovation

2019-present

September

Future Faculty Program

- Participated in seminars to improve teaching and communication skills
- Obtained feedback from experts through two teaching observations

RESEARCH MENTORING

Asha Ramanujam, PhD student from Purdue ChemE

November 2021-present

- Project title: Stochastic Programming for Electrification

Haoyue Liang, Undergraduate student from CMU ChemE

September 2018-August 2019

- Jointly supervised with Prof. Ignacio Grossmann
- Project title: Stochastic Mixed-integer Nonlinear Programming Libraries

Hyukjae Kwark, Undergraduate student from CMU ChemE

September 2018-August 2019

- Jointly supervised with Prof. Ignacio Grossmann
- Project title: Stochastic Mixed-integer Nonlinear Programming Libraries

Zedong Peng, Visiting PhD student from Zhejiang University

August 2019-August 2020

- Jointly supervised with Prof. Ignacio Grossmann in collaboration with SK Innovation
- Project title: Multi-period Design and Planning Model of Shale Gas Field Development

Yue Sha, Visiting PhD student from Tsinghua University

January 2019-July 2019

- Jointly supervised with Prof. Ignacio Grossmann
- Project title: Integrated Scheduling and Procurement under Endogenous Uncertainty using Stochastic Programming

Nikhil Eti, Master student from CMU ChemE

August 2019-June 2020

- Jointly supervised with Prof. Ignacio Grossmann in collaboration with SK Innovation
- Project title: Multi-period Design and Planning Model of Shale Gas Field Development

Divyam Mandalia, Master student from CMU ChemE

January 2019- December 2019

- Jointly supervised with Prof. Ignacio Grossmann in collaboration with Total
- Project title: Integration of reservoir modeling with oilfield planning and infrastructure optimization

PUBLICATION

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- [1] 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.
 - [2] 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.
 - [3] 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.
 - [4] 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.
 - [5] 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*.
 - [6] 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.
 - [7] Perez, H. D., Hubbs, C. D., Li, C., & Grossmann, I. E. (2021). Algorithmic Approaches to Inventory Management Optimization. *Processes*, 9(1), 102.
 - [8] 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.
 - [9] 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.
 - [10] 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.
 - [11] 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.
 - [12] 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.
 - [13] 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.
 - [14] 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.
 - [15] 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.

CONFERENCE PRESENTATIONS

- [1] **Can Li**, Antonio J. Conejo, Peng Liu, Benjamin P. Omell, John D. Sirola, Ignacio E. Grossmann (2021) Mixed-integer Linear Programming Models And Algorithms For Generation And Transmission Expansion Planning Of Power Systems. INFORMS Annual Meeting
- [2] **Can Li**, Antonio J. Conejo, John D. Sirola, Ignacio E. Grossmann (2021) On representative day selection for capacity expansion planning of power systems under extreme events. AIChE Annual Meeting, Boston.
- [3] **Can Li**, Antonio J. Conejo, Peng Liu, Benjamin P. Omell, John D. Sirola, Ignacio E. Grossmann (2020) Power Systems Infrastructure Planning with High Renewables Penetration. AIChE Annual Meeting, San Francisco.
- [4] **Can Li**, David E. Bernal, Kevin C. Furman, Marco A. Duran, Ignacio E. Grossmann (2020) Sample Average Approximation for Stochastic Nonconvex Mixed Integer Nonlinear Programming via Outer-Approximation. AIChE Annual Meeting, San Francisco.
- [5] **Can Li**, David E. Bernal, Kevin C. Furman, Marco A. Duran, Ignacio E. Grossmann (2020) Sample Average Approximation for Stochastic Nonconvex Mixed Integer Nonlinear Programming via Outer-Approximation. INFORMS Annual Meeting.
- [6] **Can Li**, Ignacio E. Grossmann (2019). A finite ϵ -convergence algorithm for two-stage stochastic convex nonlinear programs with mixed-binary first and second stage variables. XV ICSP conference, Trondheim.
- [7] **Can Li**, Ignacio E. Grossmann (2019). On Solving Nonconvex Two-stage Stochastic Programs With Generalized Benders Decomposition. INFORMS Annual Meeting, Seattle.
- [8] **Can Li**, Ignacio E. Grossmann, John P. Eason, Markus G. Drouven (2019). Single Pad Planning Under Uncertainty for Shale Gas Development. AIChE Annual Meeting, Orlando.
- [9] **Can Li**, Ignacio E. Grossmann (2018). On Solving Nonconvex Two-stage Stochastic Programs with Generalized Benders Decomposition. AIChE Annual Meeting, Pittsburgh.
- [10] **Can Li**, Ignacio E. Grossmann (2018). A finite ϵ -convergence algorithm for two-stage convex 0-1 mixed-integer nonlinear stochastic programs with mixed-integer first and second stage variables. INFORMS Annual Meeting, Phoenix.
- [11] **Can Li**, Ignacio E. Grossmann (2018). An Improved L-shaped Method for Two-stage Convex 0-1 Mixed Integer Nonlinear Stochastic Programs. PSE 2018, San Diego.

INVITED SEMINAR

- [1] 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
- [2] Can Li (2022). Algorithms and Software for Two-stage Stochastic Mixed-integer Nonlinear Programs. Coffee talk at Polytechnique Montreal. Invited by Prof. Andrea Lodi
- [3] 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.
- [4] Can Li (2021). Algorithms and Software for Two-stage Stochastic Mixed-integer Nonlinear Programs. Los Alamos National Laboratory, invited by Dr. Harsha Nagarajan
- [5] Can Li (2018). On Solving Stochastic Mixed-integer Nonlinear Programs. Department of Chemical Engineering, Tsinghua University, invited by Prof. Yushan Zhu

HONORS AND AWARDS

- CAST Division Student Presentation Award, 3rd place, 2021
- Honorable mention award, 42nd Annual CHEGSA Symposium, Carnegie Mellon University, 2020

- Best Poster Award, Center for Advanced Process Decision-making (CAPD) annual meeting, 2018
- Jinyong Award, Department of Chemical Engineering, Tsinghua University, 2015
- CSC Scholarship, Exchange Student at UW-Madison, 2014
- Lijieshen Award, Department of Chemical Engineering, Tsinghua University, 2014
- Second Prize, Physics Olympiad for Undergraduates in Beijing, 2014
- Member, Spark Talents Program for Technological Innovation, Tsinghua University, 2014
- Comprehensive Excellent Scholarship (3/116 in Department of Chemical Engineering), Tsinghua University, 2013
- First Prize (1st of Henan Province), National Olympiad in Chemistry, 2011

REVIEW SERVICE

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

CONFERENCE ORGANIZATION

- Cluster Chair, INFORMS Annual Meeting, 2020
- Session Chair, INFORMS Annual Meeting, 2020
- Session Chair, XV ICSP conference, Trondheim, 2019.