

ZHEYU JIANG

School of Chemical Engineering
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🌐 <https://checlams.github.io>

EDUCATION

Ph.D., Purdue University, Chemical Engineering 2014 – 2018
Advisors: Rakesh Agrawal and Mohit Tawarmalani
Dissertation: Multicomponent Distillation – Mathematical Modeling, Global Optimization, and Process Intensification

B.Ch.E. (Honors), *magna cum laude*, University of Minnesota 2010 – 2014
Advisor: Michael Tsapatsis
Thesis: Simultaneous Optimization of Heat Exchanger Network in Crude Oil Fractionation System

PROFESSIONAL APPOINTMENTS

Oklahoma State University August 2021 – Present
Assistant Professor

- Lead the Computational Laboratory of Advanced Manufacturing and Sustainability (CLAMS) at OSU
- Develop mathematical and computational theories and tools to address process design, optimization, and control problems in industrial decarbonization, separations, and digital agriculture

The Dow Chemical Company/Corteva Agriscience July 2019 – July 2021
Research Investigator - Process Development Engineer

- Developed robust and low-cost synthetic routes and optimized separation and crystallization technologies to enable the launch of Adavelt fungicide by reducing its solvent consumption by 60% and costs of manufacturing by 40%
- As the company's subject matter expert on liquid separations, designed, optimized, and implemented several new solvent purification and recovery processes for multiple crop protection actives during their process development and manufacturing stages

Purdue University August 2014 – October 2018
Graduate Research Assistant

- Solved a longstanding problem in chemical engineering of developing a shortcut method for minimum reflux calculation for multicomponent distillation in multi-feed, multi-product columns
- Developed the first enumeration based global optimization algorithm to identify distillation configurations that can save up to 50% of total cost or total exergy loss compared to conventional schemes
- For the first time, proposed a systematic multi-layer approach for process intensification in multicomponent distillation, offering industrial practitioners an easy-to-follow recipe to synthesize numerous new and intensified configurations that further enhance operability, improve efficiency, and reduce costs

The Dow Chemical Company May 2016 – August 2016
PhD R&D Intern

- Synthesized novel multicomponent distillation sequences for several Dow's core processes that saved up to 10-15% in energy consumption and capital cost compared to current most effective technologies
- Hosted weekly meetings involving R&D, engineering, and business experts regarding potential innovation and retrofit opportunities for implementing these newly identified configurations

University of Minnesota November 2012 – May 2014
Undergraduate Research Assistant

- Developed the first solution processable method to achieve purification of sub-100 nm thin film of exfoliated MFI zeolite nanosheets using density gradient centrifugation
- Optimized experimental procedure that fabricated high-quality α -alumina membrane supports based on colloidal dispersion processing for MFI nanosheet coating
- Studied complete removal of organic structural directing agent in MFI nanosheets by acid treatment

Honeywell UOP

June 2013 – August 2013

Engineering Support Specialist

- Created new UniSim based process simulations for UOP's Oleflex and FCC technologies and successfully built activity coefficient models to describe the VLE and LLE for all major components involved
- Established a crude oil thermodynamic properties databank for major global oil reserves

PROFESSIONAL SERVICE

Session Chair and International Scientific Committee, the 10th International Conference on Foundations of Computer-Aided Process Design (FOCAPD)	2024
Guest Editor, Data-Driven Modeling, Optimization and Control of Chemical Processes, <i>Processes</i>	2024
Chair/Co-Chair, CAST Division 10a,c,d,e AIChE Annual Meeting	2023 – 2024
Co-chair, Invited Session: Decarbonization of Chemical Process Industries via Electrification, INFORMS Annual Meeting	2024
Chair, Advances in Machine Learning, FOCAPO/CPC Conference	2023
Panel Reviewer, National Science Foundation, U.S. Department of Agriculture	2024
Reviewer, <i>AIChE Journal</i> , <i>Computers and Chemical Engineering</i> , <i>Industrial & Engineering Chemistry Research</i> , <i>Chemical Engineering Research and Design</i> , <i>ACS Omega</i> , <i>Journal of Taiwan Institute of Chemical Engineers</i> , <i>Chemical Engineering Transactions</i> , <i>Digital Chemical Engineering</i>	2017 – Present

PROJECTS

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4. **Single PI**, "CAREER: Data-driven, Physics-augmented Process Systems Engineering Framework for Digital, Sustainable Agriculture", *National Science Foundation* (Award Number: 2442806), January 2025 – December 2030, \$500,000
 3. **Co-PI**, "EAGER: CET: Decentralized Algorithms for Integrating Decarbonized Chemical Process Heating with Renewable-driven, Electric Power Systems", *National Science Foundation* (Award Number: 2343072), July 2024 – June 2026, \$299,050 (Jiang: \$152,780)
 2. **Single PI**, "FARM: Fast, Accurate, Robust Fault Detection and Diagnosis Software for Industrial Distillation Monitoring", *OCAST Oklahoma Applied Research Support* (Award Number: AR24-069), April 2024 – March 2026, \$136,000
 1. **Single PI**, "I-Corps: Process Monitoring and Diagnosis Software for Decarbonizing Industrial Distillation", *National Science Foundation* (Award Number: 2331080), June 2023 – November 2024, \$50,000

RECOGNITIONS AND AWARDS

National Science Foundation CAREER Award	2025
Foundations of Process Analytics and Machine Learning 2023 Travel Award for Junior Faculty	2023
Early-career pioneering research featured in 2022 Futures Issue, <i>AIChE Journal</i>	2022
People's Choice Award, Corteva Agriscience	2019
AIChE Separations Division Graduate Student Research Award	2018
Eastman Graduate Travel Grant, Purdue University	2017
Purdue Graduate Student Government Travel Grant, Purdue University	2016
Global Excellence Scholarship, UMN	2010 – 2014
College of Science and Engineering Merit Scholarship, UMN	2012
Charles A. Mann Award, Department of Chemical Engineering and Material Science, UMN	2012

PEER-REVIEWED BOOK CHAPTERS (* indicates corresponding author)

1. Ghasemi S, Kareck T, Xiao L, Reed R, Ramanan P, Jiang Z*. Decarbonization of Steam Cracking for Clean Olefins Production: Microgrid Planning and Operation. In: *Optimization of Sustainable Process Systems: Multiscale Models and Uncertainties*. John Wiley & Sons, Inc. 2025;

PEER-REVIEWED JOURNAL PUBLICATIONS (* indicates corresponding author)

9. Ma F, Ji C, Wang J, Sun W, Tang X, Jiang Z*. MOLA: Enhancing industrial process monitoring using a multi-block orthogonal long short-term memory autoencoder. *Processes*. 2024;12(12):2824.
 - Invited Special Issue: Process Modeling, Simulation, and Optimization in Chemical Engineering
8. Jiang Z*, Tawarmalani M, Agrawal R. Minimum reflux calculation for multicomponent distillation in multi-feed, multi-product columns: Mathematical model. *AIChE Journal*. 2022;68:e17929.
 - Invited article in the 2022 Futures Issue of AIChE Journal featuring pioneering early career researchers
7. Jiang Z*. A shortcut minimum reflux calculation method for distillation columns separating multi-component homogeneous azeotropic mixtures. *Le Scientifique*. 2020;2020(1):17–25.
 - Featured in the inaugural issue of *Le Scientifique*, the peer-reviewed academic journal for Corteva scientists
6. Jiang Z, Chen Z, Huff J, Shenvi A, Tawarmalani M, Agrawal R. Global minimization of total exergy loss of multicomponent distillation configurations. *AIChE Journal*. 2019;65(11):e16737
5. Jiang Z, Mathew TJ, Huff J, Nallasivam U, Tawarmalani M, Agrawal R. Global optimization of multicomponent distillation configurations: Global minimization of total cost for multicomponent mixture separations. *Computers & Chemical Engineering*. 2019;126:249–262
4. Jiang Z, Agrawal R. Process intensification in multicomponent distillation: A review of recent advancements. *Chemical Engineering Research and Design*. 2019;147:122–145.
 - Invited review article in the special issue on 11th International Conference on Distillation & Absorption
3. Jiang Z, Madenoor Ramapriya G, Tawarmalani M, Agrawal R. Process intensification in multicomponent distillation. *Chemical Engineering Transactions*. 2018;69:841–846
2. Jiang Z, Madenoor Ramapriya G, Tawarmalani M, Agrawal R. Minimum energy of multicomponent distillation systems using minimum additional heat and mass integration sections. *AIChE Journal*. 2018;64(9):3410–3418
1. Agrawal KV, Topuz B, Jiang Z, Nguenkam K, Elyassi B, Francis LF, Tsapatsis M, Navarro M. Solution-processable exfoliated zeolite nanosheets purified by density gradient centrifugation. *AIChE Journal*. 2013;59(9):3458–3467.
 - Invited article in the special issue of AIChE Journal Founders Tribute to Neal R. Amundson

PEER-REVIEWED CONFERENCE PROCEEDINGS (* indicates corresponding author)

8. Miraliakbar A, Jiang Z*. Fast, Accurate, and Robust Fault Detection and Diagnosis of Industrial Processes. *Systems & Control Transactions*. 2024;3:322–329
7. Jiang Z*. Online monitoring and robust, reliable fault detection of chemical process systems. *Computer Aided Chemical Engineering*. 2023;52:1621–1626
6. Ghasemi Naraghi S, Jiang Z*. Stochastic optimization of agrochemical supply chains with risk management. *Computer Aided Chemical Engineering*. 2023;52:3335–3340
5. Song Z, Jiang Z*. A data-driven modeling approach for water flow dynamics in soil. *Computer Aided Chemical Engineering*. 2023;52:819–824
4. Ghasemi Naraghi S, Jiang Z*. Stochastic Optimization of Global Agrochemical Supply Chains with Risk Management. In: *Proceedings of IISE Annual Conference and Expo 2023*. New Orleans, LA. 2023;

3. Xie J, Jiang Z*, Yao B. The Effect of Different Optimization Strategies to Physics-Constrained Deep Learning for Soil Moisture Estimation. In: *Proceedings of IISE Annual Conference and Expo 2023*. New Orleans, LA. 2023;
2. Song Z, Jiang Z*. A data-driven random walk approach for solving water flow dynamics in soil systems. In: *Proceedings of Foundations of Computer-Aided Process Operations and Chemical Process Control Conference*. San Antonio, TX. 2023;
 - One of the 48 papers selected for oral presentation at FOCAPO/CPC 2023
1. Jiang Z*. A shortcut model for multicomponent homogeneous azeotropic distillation. In: *Proceedings of Foundations of Computer-Aided Process Operations and Chemical Process Control Conference*. San Antonio, TX. 2023;

SUBMITTED MANUSCRIPTS (* indicates corresponding author)

7. Miraliakbar A, Jiang Z*. Online Fault Detection and Classification of Chemical Process Systems Leveraging Statistical Process Control and Riemannian Geometric Analysis. 2025. Under review by *Computers and Chemical Engineering*, preprint available at arXiv:2504.01276
6. Jiang Z*, Tawarmalani M, Agrawal R. Minimum reflux calculation for multicomponent distillation in multi-feed, multi-product columns: Algorithms and examples. 2025. Under review by *AIChE Journal*, preprint available at arXiv:2503.20917
5. Ghasemi Naraghi S, Jiang Z*. Multi-objective Optimization of Steam Cracking Microgrid for Clean Olefins Production. 2025. Accepted by *Systems & Control Transactions*
4. Ghasemi Naraghi S, Jiang Z*. Joint Optimization of Fair Facility Allocation and Robust Inventory Management for Perishable Consumer Products. 2025. Accepted by *Systems & Control Transactions*
3. Song Z, Jiang Z*. A Novel Bayesian Framework for Inverse Problems in Precision Agriculture. 2025. Accepted by *Systems & Control Transactions*
2. Song Z, Jiang Z*. A Physics-based, Data-driven Numerical Framework for Anomalous Diffusion of Water in Soil. 2025. Accepted by *Systems & Control Transactions*
1. Song Z, Jiang Z*. A Novel Data-driven Numerical Method for Hydrological Modeling of Water Infiltration in Porous Media. 2023. Under review by *Chemical Engineering Science*, preprint available at arXiv:2310.02806

WORKING MANUSCRIPTS (* indicates corresponding author)

2. Fang W, Ji C, Ma F, Jiang Z, Wang J, Sun W. Harnessing Process Knowledge via Soft Sensing for Accurate Online Monitoring: A Study on the Dow Data Challenge Problem. 2025
1. Xie J, Jiang Z, Yao B. Physics-constrained Active Learning for Soil Moisture Estimation and Optimal Sensor Placement. 2024. Preprint available at arXiv:2403.07228

PATENT & PATENT APPLICATIONS

1. "Polymorphs of compounds having pesticidal activity". WO 2022/072650 A1, published on April 7, 2022

PRESENTATIONS & TALKS

45. Jiang Z. Toward Sustainable Chemical and Food Production via Systems Engineering Approaches. 2025. Graduate Seminar Series, School of Matter, Transport and Energy, Arizona State University, Tempe, AZ (Host: Bhavik Bakshi)
44. Ghasemi Naraghi S, Kareck T, Reed R, Ramanan P, Jiang Z. Multi-objective Optimization of Steam Cracking Microgrid for Clean Olefins Production. 2025. 35th European Symposium on Computer Aided Process Engineering (ESCAPE)

43. Ghasemi Naraghi S, Kareck T, Jiang Z. Decarbonization of Steam Cracking for Clean Olefins Production: Optimal Microgrid Scheduling. 2024. INFORMS Annual Meeting
42. Reed R, Ramanan P, Ghasemi Naraghi S, Jiang Z. Decentralized Operations Planning of Decarbonized Chemical Plants with Renewable-driven Transmission Systems. 2024. INFORMS Annual Meeting
41. Jiang Z. Decarbonization of Chemical Process Industries via Electrification. 2024. INFORMS Annual Meeting
40. Song Z, Jiang Z. DRW-BO: A Bayesian Framework for Parameter Estimation for Fractional Richards Equation with Applications in Precision Agriculture. 2024. AIChE Annual Meeting
39. Rane A, Zomorodiyani M, Feng Y, Jiang Z, Deep A. Fast, Accurate, and Robust Fault Detection and Diagnosis of Industrial Processes. 2024. AIChE Annual Meeting
38. Miraliakbar A, Ma F, Jiang Z. Online Fault Detection and Diagnosis of Industrial Processes Via Data Augmentation and Integrative Learning of Process Knowledge and Fault Propagation Map. 2024. AIChE Annual Meeting
37. Ma F, Miraliakbar A, Tang X, Jiang Z, Sun W. Fast, Accurate Process Monitoring Based on Multi-Block Mutual Information and Nonparametric Statistical Process Control. 2024. AIChE Annual Meeting
36. Ghasemi Naraghi S, Jiang Z. Joint optimization of fair facility allocation and robust inventory management for perishable consumer products. 2024. AIChE Annual Meeting
35. Miraliakbar A, Jiang Z. Fast, Accurate, and Robust Fault Detection and Diagnosis of Industrial Processes. 2024. Foundations of Computer Aided Process Design (FOCAPD) 2024 Conference
34. Jiang Z. Process Systems Engineering Applications in Sustainable Agriculture and Chemical Manufacturing. 2024. PSE Seminar Series, Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, MN (Host: Qi Zhang)
33. Jiang Z. Toward Sustainable, Intensified Food and Chemical Productions via Process Systems Engineering Approaches. 2024. School of Chemical, Biological and Environmental Engineering, Oregon State University, Corvallis, OR (Host: Cory Simon)
32. Jiang Z. Decarbonization of Industrial Distillation via Systems Engineering Approaches. 2023. 2023 ChemE Show, Galveston, TX (Host: Tony Cai)
31. Song Z, Jiang Z. A Computationally Efficient Data-Driven Framework for Solving Water Flow Dynamics in Soil Via Fractional Diffusion Model. 2023. AIChE Annual Meeting
30. Song Z, Jiang Z. A Data-Driven Numerical Method for Solving Water Flow Dynamics in Soil. 2023. AIChE Annual Meeting
29. Song Z, Jiang Z. A Data-Driven Numerical Framework for the Richards Equation for Sustainable Irrigation and Food Production. 2023. AIChE Annual Meeting
28. Miraliakbar A, Jiang Z. Online Monitoring and Robust, Reliable Fault Detection and Diagnosis of Chemical Process Systems. 2023. AIChE Annual Meeting
27. Ghasemi Naraghi S, Jiang Z. Perspective Reformulation of Stochastic Agrochemical Supply Chain Optimization Problem with Mean-Variance Risk Management. 2023. AIChE Annual Meeting
26. Ghasemi Naraghi S, Jiang Z. Stochastic Bilevel Optimization of Agrochemical Supply Chains with Mean-Variance Risk Management. 2023. AIChE Annual Meeting
25. Jiang Z. Creating a Sustainable Food Future via Systems Engineering Approaches. 2023. ACS Southwest Regional Meeting (SWRM), Oklahoma City, OK (Host: H. N. Cheng)

24. Jiang Z. Toward Sustainable Food and Chemical Productions via Systems Engineering Approaches. 2023. Cornell University, Ithaca, NY (Host: Fengqi You)
 - One of Ezra's Round Table/Systems Seminar Series featured by Cornell Systems Engineering Program
23. Jiang Z. Decarbonization of Industrial Distillation via Shortcut modeling, Global Optimization, and Process Intensification – Recent Advancements, Case Studies, and Future Perspectives. 2023. Phillips 66 Research Center, Bartlesville, OK (Host: Karthik Marimuthu)
 - Inaugural quarterly seminar series in 2023 for AIChE Bartlesville Chapter
22. Miraliakbar A, Jiang Z. FARM: A Fast, Accurate, Robust fault detection and diagnosis framework for industrial process Monitoring. 2023. Foundations of Process/product Analytics and Machine learning, Davis, CA
21. Jiang Z. Creating a Sustainable Food Future in the 21st Century. 2023. Department of Biosystems & Agricultural Engineering, Oklahoma State University, Stillwater, OK
20. Jiang Z. AI Applications in Chemical Process Industry. 2023. AIChE Spring Meeting, Houston, TX (Host: Senthil Krishnamoorthy)
19. Song Z, Jiang Z. A data-driven random walk approach for solving water flow dynamics in soil systems. 2023. The Foundations of Computer-Aided Process Operations and Chemical Process Control (FOCAPO/CPC) 2023 Conference, San Antonio, TX
18. Jiang Z. A shortcut model for multicomponent homogeneous azeotropic distillation. 2023. The Foundations of Computer-Aided Process Operations and Chemical Process Control (FOCAPO/CPC) 2023 Conference, San Antonio, TX
17. Jiang Z. Transforming Junior-year Separations Course into an Early-capstone Learning Experience. 2022. ASCE/AIChE Summer School for Engineering Faculty, Golden, CO
16. Jiang Z. Creating a Sustainable Manufacturing and Food Future via Process Systems Engineering Innovations. 2021. School of Industrial Engineering and Management, Oklahoma State University, Stillwater, OK (Host: Joseph Nuamah)
15. Jiang Z. Advancing Future-generation Separation Technologies via Systems Engineering Innovations: Multicomponent Distillation and Beyond. 2021. School of Chemical Engineering, Oklahoma State University, Stillwater, OK
14. Jiang Z. Creating a Sustainable Food Future by 2050 via Systems Engineering Innovations. 2021. Chemical and Biological Engineering Department, University of Wisconsin, Madison, WI (Host: Victor Zavala)
13. Jiang Z. Advancing Future-generation Separation Technologies via Process Systems Engineering Innovations. 2021. Chemical and Biological Engineering Department, University of Wisconsin, Madison, WI (Host: Victor Zavala)
12. Jiang Z. Innovating Future-generation Separation Technologies via Process Systems Engineering. 2020. Virtual AIChE Annual Meeting
11. Jiang Z. Innovating Future-generation Separation Processes via Systems Engineering. 2020. Prof. Fengqi You's group, Cornell University, Ithaca, NY (Host: Fengqi You)
10. Jiang Z. Minimum reflux calculation for multicomponent azeotropic distillation using shortcut method. 2019. AIChE Annual Meeting, Orlando, FL
9. Jiang Z. A shortcut model for multicomponent azeotropic distillation column design. 2019. AIChE Annual Meeting, Orlando, FL
8. Jiang Z. A Modeling Approach to Designing Effective Solvent Exchange and Recycle Processes for Agrochemical Active Ingredient Manufacturing. 2019. Crop Protection Product Design & Process Summit, Indianapolis, IN (Host: Abraham Schuitman)

7. Jiang Z, Tawarmalani M, Agrawal R. Minimum reflux behavior of multicomponent mixture separation using complex distillation columns. 2018. AIChE Annual Meeting, Pittsburg, PA
6. Jiang Z, Tawarmalani M, Agrawal R. A new minimum reflux calculation method for multiple-feed distillation columns distilling ideal multicomponent mixtures. 2017. AIChE Annual Meeting, Minneapolis, MN
5. Jiang Z, Tawarmalani M, Agrawal R. Process intensification in multicomponent distillation. 2017. AIChE Annual Meeting, Minneapolis, MN
4. Jiang Z, Tawarmalani M, Agrawal R. Process intensification in multicomponent distillation. 2017. AIChE Spring Meeting, San Antonio, TX
3. Jiang Z, Madenoor Ramapriya G, Tumbalam Gooty R, Tawarmalani M, Agrawal R. Minimum energy of multicomponent distillation systems using minimum additional number of heat and mass integration sections. 2016. AIChE Annual Meeting, San Francisco, CA
2. Jiang Z, Madenoor Ramapriya G, Tumbalam Gooty R, Tawarmalani M, Agrawal R. Process intensification of multicomponent distillation configurations using minimum additional number of heat and mass integration sections. 2016. AIChE Annual Meeting, San Francisco, CA
1. Jiang Z, Madenoor Ramapriya G, Tumbalam Gooty R, Tawarmalani M, Agrawal R. A method for minimization of total exergy loss over the complete search space of regular distillation configurations. 2016. AIChE Annual Meeting, San Francisco, CA

STUDENT MENTORSHIP

Graduate Students: Zeyuan Song (Spring 2022 – Present), Saba Ghasemi Naraghi (Spring 2022 – Present)

Undergraduate Students: Nate Peak (Spring 2023, OSU Freshman Research Scholar), Tylee Kareck (Fall 2023 – Present, OSU CEAT Undergraduate Research Scholar)

DISSERTATION COMMITTEE

Suhao Chen (now Assistant Professor in Industrial Engineering at South Dakota Mines)	Summer 2022
Batuhan Bal (CHE Ph.D. proposal & thesis defense committee)	Fall 2023, Spring 2024
Rashed Islam (CHE M.S. thesis defense committee)	Fall 2023
Ricky Reed (IEM M.S. thesis defense committee)	Fall 2023

TEACHING (student course evaluation results are based on a total score of 5)

Lead Instructor, CHE 3113 – Rate Operations II, OSU (4.0, 4.4, 4.5)	Spring 22, 23, 24
Lead Instructor, CHE 6010 – CHE Graduate Seminar, OSU (4.5, 4.5)	Fall 23, Spring 24
Lead Instructor, CHE 2581 – CHE Sophomore Seminar, OSU (4.7)	Fall 2022
Co-Instructor, CHE 4124 – Chemical Engineering Design I, OSU (4.5, 4.4)	Fall 21, 23

SYNERGISTIC ACTIVITIES & OUTREACH

Service to the University: *Member*, chemical engineering faculty search committee (2022); *Committee Member*, CEAT Scholars (2023), Freshman Research Scholars (2023 – Present)

Outreach: OSU LGBTQ Safe Zone Ally Program (2023), Oklahoma State Science and Engineering Fair (2022, 2023), CEAT Annual Graduate Research Symposium (2023), OSU CEAT Discovery Days (2023), OSU Rural Renewal Initiative (2023 – 2025)

Software Commercialization: Developed a real-time process monitoring system named FARM for industrial distillation systems. FARM helps derisk distillation column operation and improve its energy efficiency and carbon footprint by 15-20%. We receive funding from OSU Spears School of Business, OSU Cowboy Innovations, Oklahoma Center for Advancement of Science & Technology (OCAST), and NSF I-Corps program. We are also supported by Cowboy Leaders Network to explore commercialization avenues and by Fractionation Research Inc. (FRI), the world's leading distillation research consortium, to test, validate, and improve FARM's performance.

PROFESSIONAL SOCIETIES

American Institute of Chemical Engineers (AIChE), American Chemical Society (ACS), Institute of Industrial and Systems Engineers (IISE), Institute for Operations Research and the Management Sciences (INFORMS)