# PENGFEI CHENG

pengfeicheng@gatech.edu
LinkedIn URL: www.linkedin.com/in/pengfei-cheng

## EDUCATION

**Georgia Institute of Technology**                                                      Atlanta, GA
*Doctor of Philosophy*, Chemical and Biomolecular Engineering, GPA: 4.0/4.0          Expected 2024
Research advisor: Dr. Joseph K. Scott

**Carnegie Mellon University**                                                        Pittsburgh, PA
*Master of Science*, Chemical Engineering, GPA: 3.92/4.0                                 Dec. 2018
Research advisor: Dr. Ignacio E. Grossmann

**Dalian University of Technology**                                                   Dalian, China
*Bachelor of Engineering*, Chemical Engineering, GPA: 3.85/4.0                            July 2017

## RELEVANT COURSES

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|---|---|
| **Process Systems Engineering** | Advanced Process Systems Engineering, Computational Methods for Process Engineering, Mathematical Modeling of Chemical Engineering Processes, Data Analysis and Chemical Engineering |
| **Math Programming & Analysis** | Linear Programming, Integer Programming*, Constraint Programming, Disjunctive Programming, Analysis I |

*audited course

## RESEARCH EXPERIENCE

**Convergence Rate Analysis for Decomposition Methods for Global Optimization**     Dec. 2019 - Present
*Advisor: Dr. Joseph K. Scott*

· Analyzing convergence rate of Lagrangean decomposition-based methods to assess their performance on general nonconvex stochastic programs
· Built test instances with various regularity conditions to numerically investigate convergence rates of different decomposition methods

**Optimal Scheduling of Copper Concentrate Operations under Uncertainty**          Dec. 2017 - July 2019
*Advisor: Dr. Ignacio E. Grossmann, collaborative project with Aurubis AG*

· Developed an MINLP model for copper concentrate smelting process utilizing continuous-time representation with priority slots
· Developed and enhanced an MILP-NLP decomposition strategy to solve nonconvex MINLP model to near global optimality within reasonable time
· Implemented robust optimization and flexibility analysis coordinately to effectively formulate the uncertainty in elemental compositions of concentrates and assess its effects in various scenarios

**Prediction of Adsorption Properties of Metal-Organic Frameworks (MOFs) with Framework Flexibility**
*Graduate Course Project*                                                            Feb. 2020 - May 2020

· Constructed fast, accurate regression models to predict MOF adsorption uptakes considering the effect of framework flexibility based on rigid crystal model results
· Formulated models with 28 MOF features, 6 adsorbate features and 801 (MOF, adsorbate) pairs
· Built and analyzed performance of multi-linear regression, RBF, KRR, LASSO and neural network models

### Record-to-Record Travel with a Variable-Length Neighbor List          Sep. 2017 - Dec. 2017
*Graduate Course Project*
- Built Record-to-Record Travel with a Variable-Length Neighbor List (VRTR) metaheuristics algorithm in Python to deal with large-scale vehicle routing problems
- Examined performance of the algorithm on 20 benchmark problems and improved its efficiency by conducting parametric analysis on the length of neighbor list

## PUBLICATIONS

- **Cheng, P.**, Garcia-Herreros, P., Lalpuria, M., & Grossmann, I. E. (2020). Optimal Scheduling of Copper Concentrate Operations under Uncertainty. *Computers & Chemical Engineering*, 106919.

## TEACHING EXPERIENCE

### Undergraduate Process Control Lab          Spring 2020
*Teaching Assistant*

## PRESENTATIONS

- Dillard Robertson, **Pengfei Cheng**, Joseph Scott, "Convergence Rate Analysis for Schemes of Relaxations in Decomposition Methods for Global Nonconvex Stochastic Optimization", CAST plenary talk, *2020 AIChE Annual Meeting*
- Pablo Garcia-Herreros, Leonardo Salsano de Assis, **Pengfei Cheng**, Ignacio Grossmann, "Blend Scheduling Of Copper Concentrates At Aurubis AG", *2020 INFORMS Annual Meeting*
- **Pengfei Cheng**, Pablo Gracia-Herreros, Mangalam Lalpuria, Ignacio Grossmann, "Optimal Scheduling of Copper Concentrate Operations under Uncertainty", *2019 AIChE Annual Meeting*

## SKILLS

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| **Programming Languages** | Python, C, C++ |
| **Software & Tools** | Pyomo, GAMS, MATLAB, COMSOL, Aspen Series, gPROMS |

## ADDITIONAL PROJECTS

### China National Undergraduate Chemical Engineering Design Competition          Dalian, China
*Propane Dehydrogenation Plant Design*          Mar. 2016 - Aug. 2016
- National first prize among 991 teams
- Led a 5-member team to complete the comprehensive design of a propane dehydrogenation plant project, aiming at improving local propane utilization in China
- Conducted model simulation and optimization for the whole process, designed and optimized heat exchange networks, designed equipment in details
- Optimized Oleflex process by integrating multi-stage steam utilization to improve efficiency of energy utilization
- Conducted safety assessment, environmental impact assessment and economic evaluation on the project to assess the project in enterprise scale