

Research Seminar
Monday, April 28, 2014
11:30am – 1:00pm
Energy Institute Auditorium

Mixed-Integer Fractional Programming: Models, Algorithms, and Applications in Process Operations, Energy Systems, and Sustainability

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Abstract:

A wide range of optimization problems arising in practical applications can be formulated as mixed-integer fractional programming (MIFP) problems, which combine the combinatorial difficulty of optimizing over discrete variable sets with the challenges of handling the non-convex fractional objective function. This talk will explore recent results on the development of tailored global optimization algorithms to address the computational challenge of solving large-scale MIFP problems. These MIFP methods will be illustrated through three applications: (1) function-unit-based life cycle optimization of sustainable product systems and supply chains under sustainability criteria, (2) integrated optimization of production scheduling and control of continuous multi-grade polymerization reactors, and (3) optimal design and operations of algae processing network for CO₂ mitigation and biodiesel production. We will discuss the modeling frameworks, computational results, and case studies.

Biography:

Fengqi You is an Assistant Professor of Chemical and Biological Engineering at Northwestern University. He received his PhD from Carnegie Mellon University, and was an Argonne Scholar at Argonne National Laboratory before joining the faculty of Northwestern University. He has published over 50 peer-reviewed journal articles, some of which have been highlighted by news media and journal covers. He received several competitive awards, including W. David Smith, Jr. Publication Award from AIChE, Director's Fellowship from Argonne National Laboratory, and the 2013 Northwestern-Argonne Early Career Investigator Award. His research focuses on the development of novel computational models, optimization methods, and systems analysis & design tools for process engineering, energy systems and sustainability. More information about his research group can be found from the website: <<http://you.mccormick.northwestern.edu>>.

This seminar is organized by the Energy Working Group and Energy Institute. The seminar is sponsored by the Bagley College of Engineering.