Joseph K. Scott
Associate Professor, Georgia Institute of Technology
Ford ES&T, Room 2220
Atlanta, GA, 30332
joseph.scott@chbe.gatech.edu

EDUCATION

Ph.D., Chemical Engineering, April 2012

Massachusetts Institute of Technology, Cambridge, MA

Advisor: Professor Paul I. Barton

M.S., Chemical Engineering Practice, January 2008

Massachusetts Institute of Technology, Cambridge, MA

B.S., Chemical Engineering, May 2006

Wayne State University, Detroit, MI

ACADEMIC POSITIONS

Associate Professor, August 2019-Present

Department of Chemical and Biomolecular Engineering, Georgia Tech, Atlanta, GA

Assistant Professor, August 2013-2019

Department of Chemical and Biomolecular Engineering, Clemson University, Clemson, SC

Visiting Researcher, June 2013-August 2013

Department of Industrial and Information Engineering, University of Pavia, Pavia, Italy

Postdoctoral Research Associate, May 2012-August 2013

Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA

Supervisor: Professor Richard D. Braatz

INDUSTRIAL POSITIONS

Intern, November 2007-December 2007

GlaxoSmithKline, Research Triangle Park, NC

Intern, September 2007-October 2007

BASF, Ludwigshafen, Germany

Quality Control Lab Technician, June 2004-June 2006

Quaker Specialty Chemicals, Detroit, MI

HONORS AND AWARDS

Best Paper Award, IEEE Transactions on Power Systems, 2020

Plenary Speaker, American Institute of Chemical Engineers (AIChE), Computing and Systems Technology Division, 2020

Invited Speaker, Foundations of Computer-Aided Process Design (FOCAPD), 2019

Plenary Speaker, American Institute of Chemical Engineers (AIChE), Computing and Systems Technology Division, 2018

Automatica Paper Prize 2014-2016, International Federation of Automatic Control, 2017

Air Force Young Investigator Program Award, 2016

W. David Smith, Jr. Graduate Student Paper Award, AIChE, 2016

Computers and Chemical Engineering Most Cited Articles of 2010-2012 List, 2013

Best Session Paper, *Fault Detection/Accommodation II*, American Control Conference, 2013

Inaugural Best Paper Award, Journal of Global Optimization, 2012

Outstanding Seminar Award, MIT, Department of Chemical Engineering, 2009

Robert G. Wingerter Award for Excellence in Scholarship, Character, and Leadership, Wayne State University, College of Engineering, 2006

High Scholastic Average Award for Outstanding Academic Excellence, Wayne State University, College of Engineering, 2006

Presidential Scholarship, Wayne State University, 2002

INVITED LECTURES

1. Robertson, D., Cheng, P., and Scott, J.K., "Convergence Rate Analysis for Schemes of Relaxations in Decomposition Methods for Global Nonconvex Stochastic Optimization," CAST division plenary, Annual Meeting of the American Institute of Chemical Engineers (AIChE), San Francisco, CA (November 2020)

2. Scott, J.K., "Rapid and Accurate Uncertainty Propagation and Safety Verification in Chemical, Aerospace, and Robotic Systems," Department of Chemical Engineering and Materials Science, Wayne State University (February 2020)

3. Hakizimana, A. and Scott, J.K., "A Novel Optimization Approach for the Integrated Design and Operation of Flexible Manufacturing Systems," Foundations of Computer-Aided Process Design (FOCAPD), Copper Mountain, CO (July 2019)

4. Scott, J.K., "Rapid and Accurate Reachability Analysis for Nonlinear Systems by Exploiting Model Redundancy," Kolchin Seminar in Differential Algebra, New York University (March 2019)

5. Scott, J.K., "Rapid and Accurate Uncertainty Propagation, Safety Verification, and Fault Detection in Chemical, Aerospace, and Robotic Systems," Department of Chemical and Biological Engineering, University of Wisconsin-Madison (February 2019)

6. Scott, J.K., "Algorithms for Guaranteed Safety Verification and Fault Detection in Chemical, Aerospace, and Robotic Systems," Department of Chemical and Biomolecular Engineering, Georgia Institute of Technology (January 2019)

7. Shen, K., Yang, X., and Scott, J.K., "Verifying Performance Specifications for Dynamic Processes Under Uncertainty Using Backward Reachability Analysis," CAST division plenary, Annual Meeting of the American Institute of Chemical Engineers (AIChE), Pittsburg, PA (October 2018)

8. Scott, J.K., "Dealing with Uncertainty in the Simulation and Optimization of Complex Chemical and Energy Systems," School of Chemical and Biomolecular Engineering, Georgia Institute of Technology (March 2018)

9. Scott, J.K., "Efficient Solution of Mixed-Integer Multistage Stochastic Programs for the Integrated Design and Operation of Smart Manufacturing Systems using Differentiable-in-Expectation Decision Rules," Department of Industrial Engineering, Clemson university (February 2018)

10. Scott, J.K., "Efficient Solution of Mixed-Integer Multistage Stochastic Programs for the Optimal Design of Smart Manufacturing Systems using Smooth-in-Expectation Decision Rules," Department of Mathematical Sciences, Clemson university (November 2017)

11. Scott, J.K., "Advanced Relaxation Techniques for Guaranteed Global Optimization of Complex Simulations," Sandia National Laboratory (February 2017)

12. Scott, J.K., "Optimal Design and Operation of Intermittent Renewable Energy Systems," School of Chemical and Biomolecular Engineering, Cornell University (February 2015)

13. Scott, J.K., "Advanced Simulation and Optimization Techniques for Process and Energy Systems Engineering," American Institute of Chemical Engineers, Western South Carolina Local Section (February 2015)

14. Scott, J.K., "Optimal Design and Control of Renewable Energy Systems with Storage and Intermittent Generators," Department of Chemical and Biological Engineering, Princeton University (December 2014)

15. Scott, J.K., "A New Relaxation Technique for Nonconvex Stochastic Programs with Continuous Random Variables," Annual Meeting of The Institute for Operations Research and the Management Sciences (INFORMS), San Francisco, CA (November 2014)

16. Scott, J.K., "Computational Analysis of Dynamic Chemical Systems," Department of Chemical Engineering, McMaster University (March 2014)

17. Scott, J.K., "Reachability Analysis and Global Optimization of Differential-Algebraic Systems," Department of Mathematical Sciences, Clemson University (October 2013)

18. Scott, J.K., "Design of Active Inputs for Set-Based Fault Diagnosis," Department of Industrial and Information Engineering, University of Pavia (July 2013)

19. Scott, J.K., "Global Optimization of Dynamic Systems," Automatic Control Laboratory, Institute of Mechanical Engineering, Ecole Polytechnique Federale de Lausanne (EPFL), (July 2013)

20. Scott, J.K., Schaber, S.D., Wechsung, A., and Barton, P.I., "Relaxing Dynamic Optimization Problems: Convergence, Clustering, and the Effect of Time," The Fourth International Conference on Continuous Optimization, Lisbon, Portugal (July 2013)

21. Scott, J.K., "Reachability Analysis and Global Optimization of Differential-Algebraic Systems," Center for Advanced Process Decision-Making Seminar Series, Carnegie-Mellon University (May 2012)

22. Scott, J.K. and Barton, P.I., "Generalized McCormick Relaxations," Annual Meeting of The Institute for Operations Research and the Management Sciences (INFORMS), Charlotte, NC (November 2011)

23. Scott, J.K., Kim, K.K., Kishida, M., Braatz, R.D., and Barton, P.I., "Construction of Design Spaces for Batch and Continuous Processes," Workshop on Quality by Design, University of Massachusetts, Amherst (June 2011)

24. Scott, J.K. and Barton, P.I., "Interval Bounds on the Solutions of Semi-Explicit Index-One DAEs," The International Conference on Applied Mathematics, Modeling and Computational Science, Waterloo, Ontario (July 2011)

RESEARCH ACTIVITIES

Active Funding

Positive Power with Negative Emissions: Flexible NGCC Enabled by Modular Direct Air Capture, ARPA-E, co-Principal Investigator, $1,009,921 ($150,000), (January 1, 2021 – March 31, 2022)

Global ACOPF for Extreme Events and Resilient Power Grid, Technology and Engineering Solutions of Sandia, Principal Investigator, $100,000 ($100,000), (August 1, 2020 – April 29, 2022)

Fault Detection and Diagnosis for Uncertain Nonlinear Systems Using Set-Based State Estimation, National Science Foundation, Principal Investigator, $287,827 ($287,827), (January 1, 2019 – March 31, 2022)

Efficient Global Dynamic Optimization using Dynamic Cut Generation and Domain Reduction Techniques, National Science Foundation, Principal Investigator, $290,476 ($290,476), (August 15, 2018 – July 31, 2022)

RAPID Center for Process Modeling, US Department of Energy, co-Principal Investigator $300,000 ($300,000), (January 1, 2019 – March 31, 2022)

Completed Funding

Decomposition Strategies for Process Flowsheet Optimization Problems in Fossil Energy, Technology and Engineering Solutions of Sandia, Principal Investigator, $106,083 ($106,083), (January 1, 2020 – June 30, 2021)

RAPID Center for Process Modeling, SC Department of Commerce, Principal Investigator $200,000 ($200,000), (February 19, 2018 – July 31, 2019)

Strategies for Continuous Biologics Purification with New Affinity Membranes, National Institute of Health, co-Principal Investigator, $422,343, ($177,214), (September 20, 2018 – July 31, 2019)

H-Canyon Process Model Development, Savannah River Nuclear Solutions, Principal Investigator, $100,000 ($16,128), (January 9, 2019 – July 31, 2019)

Decomposition Strategies for Process Flowsheet Optimization Problems in Fossil Energy, Technology and Engineering Solutions of Sandia, Principal Investigator, $78,030 ($78,030), (December 21, 2018 – July 31, 2019)

Add on to - Global Optimization of Large-Scale AC Power Flow Problems, Technology and Engineering Solutions of Sandia, Principal Investigator, $70,817 ($70,817), (October 1, 2018 – July 31, 2019)

Lignin Fractionation and Valorization: Focusing on Both Value and Quality, US Department of Energy, Co-Principal Investigator, $1,795,239, ($147,431), (March 1, 2019 – July 31, 2019)

Air Force Young Investigator Program: Rapid and Accurate Uncertainty Propagation for Nonlinear Dynamic Systems by Exploiting Model Redundancy, Air Force Office of Scientific Research, Principal Investigator, $328,672 ($328,672), (May 1, 2016 – April 30, 2019)

Add on to - Global Optimization of Large-Scale AC Power Flow Problems, Technology and Engineering Solutions of Sandia, Principal Investigator, $40,053 ($40,053), (February 1, 2018 – September 30, 2018)

Decomposition Strategies for the Solution and Optimization of Process Flowsheets in Energy Production and Power Grid Operations, Technology and Engineering Solutions of Sandia, Principal Investigator, $33,287 ($33,287), (May 15, 2017 – August 15, 2018)

Global Optimization of Large-Scale AC Power Flow Problems, Technology and Engineering Solutions of Sandia, Principal Investigator, $57,270 ($57,270), (July 20, 2017 – September 30, 2017)

Graduate Advising

Pengfei Cheng (PhD) – *Developing Efficient Global Decomposition Algorithms for Nonconvex Stochastic Optimization*
Expected graduation: May 2024

Bowen Mu (PhD) – *Advances in Set-Based Fault Diagnosis and Robust Dynamic Optimization Algorithms for Enhanced Process Safety*
Expected graduation: December 2024

Jason Ye (PhD) – *Improving the Efficiency of Global Dynamic Optimization through Cut Generation and Domain Reduction*
Expected graduation: May 2024

Dylan Weber (PhD) – *Advances in Modeling, Numerical Simulation, and Optimization of Membrane Processes for Process Intensification*
Expected graduation: May 2023

Dillard Robertson (PhD) – *Decomposition Methods for Optimal Power Flow Problems*
Expected graduation: May 2023

Taehun Kim (PhD) – *Computational Methods for Intensifying the Design and Operation of Pressure Swing Adsorption Processes*
Expected graduation: May 2022

Yuanxun Shao (PhD) – *Advanced Convex Relaxations for Nonconvex Stochastic Programs and AC Optimal Power Flow*
Graduated: October 2020

Xuejiao Yang (PhD) – *Rapid and Accurate Fault Detection for Uncertain Nonlinear Systems Using Advanced Set-Based State Estimation Techniques*
Graduated: September 2020

Kai Shen (PhD) – *Advances in Reachability Analysis for Nonlinear Dynamic Systems*
Graduated: March 2019

Alphonse Hakazimana (PhD) – *Novel Optimization Approaches for Integrated Design and Operation of Smart Manufacturing and Energy Systems*
Graduated: November 2019

Undergraduate Advising

Haoqun (Francis) Zhao (BS) – *Comparing Algorithms for Global Dynamic Optimization*
Expected graduation: May 2023

Pei Sien (Clarisse) Tan (BS) – *Comparing Algorithms for Global Dynamic Optimization*
Expected graduation: May 2023

Lucien Fernandez (BS) – *Comparing Algorithms for Global Dynamic Optimization*
Expected graduation: May 2022

Stephen Fuller (BS) – *Algorithms for Data-Driven Fault Detection*
Expected graduation: May 2022

Cameron McCanless (BS) – *Dynamic Simulation of Pressure Swing Adsorption Processes*
Expected graduation: May 2022

Jack Tabb (BS) – *Dynamic Simulation of Pressure Swing Adsorption Processes*
Graduated: May 2020

Adam Beitz (BS) – *Machine Learning Algorithms for Biosensor Development*
Graduated: May 2019

Dillard Robertson (BS) – *Effective Design of Matlab Libraries for Fast Uncertainty Propagation via Computational Graphs*
Graduated: May 2018

Cody Allen (BS) – *The Effects of Stochastic Simulation Methods on the Optimal Design of Renewable Energy System*
Expected Graduation: May 2019

Robert Powers (BS) – *Dynamic Modeling and Optimization of a PEM Electrolyzer in a Renewable Energy System*
Graduated: May 2015

Coleman DeVore (BS) – *Dynamic Proton Exchange Membrane Fuel Cell Modeling*
Graduated: May 2015

TEACHING ACTIVITIES

Courses Taught

ChBE 4411 – Process Control (UG)

Department of Chemical and Biomolecular Engineering, Georgia Tech, Spring 2021, Fall 2021

ChBE 2130 – Thermodynamics (UG)

Department of Chemical and Biomolecular Engineering, Georgia Tech, Fall 2019, Fall 2020

ChBE 4699 – Undergraduate Research (UG)

Department of Chemical and Biomolecular Engineering, Georgia Tech, Spring 2020-Fall 2021

CHE 8040 – Advanced Thermodynamics 1 (G)

Department of Chemical and Biomolecular Engineering, Clemson University, Fall 2017-18

CHE 2200 – Thermodynamics 1 (U)

Department of Chemical and Biomolecular Engineering, Clemson University, Spring 2014-18

CHE 8140 – Applied Numerical Methods in Process Simulation (G)

Department of Chemical and Biomolecular Engineering, Clemson University, Fall 2014, 16, Spring 2018

CHE 4070/4071 – Unit Operations Lab II (U)

Department of Chemical and Biomolecular Engineering, Clemson University, Fall 2013, 2015

CHE 4910 – Special Projects (UG)

Department of Chemical and Biomolecular Engineering, Clemson University, Fall 2016-18, Spring 2017-19

CHE 8950 – Graduate Seminar (G)

Department of Chemical and Biomolecular Engineering, Clemson University, Fall 2016, Spring 2017

10.34 - Numerical Methods Applied to Chemical Engineering (G)

Department of Chemical Engineering, Massachusetts Institute of Technology, Fall 2011

AFFILIATIONS AND SERVICE

Member, American Institute of Chemical Engineers, 2005-Present

Member, IEEE, 2013-2015, 2018-Present

Member, IFAC Technical Committee on Optimal Control (TC 2.4), 2021-Present

Member, IFAC Technical Committee on Chemical Process Control (TC 6.1), 2019-Present

Member, Institute for Operations Research and the Management Sciences, 2014-2016

Editor, *Optimal Control Applications and Methods*, 2019-Present

Editor, *Processes*, 2018-2020

Review Editor, Frontiers in Energy Research: Process and Energy Systems Engineering, 2015-2020

Associate Editor, IEEE Conference on Control Technology and Applications, 2020-2022

Associate Editor at Large, IEEE Conference on Decision and Control, 2020-2021

Technical Associate Editor, IFAC World Congress, 2020

Associate Editor, American Control Conference, 2018-2019

Program Coordinator, AIChE National Conference, Computing and Systems Technology Division, Area 10d, 2020

International Programming Committee, Foundations of Computer-Aided Design, 2019

Session Chair, AIChE National Conference, 2014-2019

Session Chair, AIChE Spring Conference, 2019

Session Chair, IEEE Conference on Decision and Control, 2018

Session Chair, American Control Conference, 2018

Session Chair, Foundations on Computer-Aided Process Operations, 2017

Active reviewer for Automatica, IEEE Transactions on Automatic Control, the Journal of Optimization Theory and Applications, the Journal of Global Optimization, Computers and Chemical Engineering, Journal of the AIChE, SIAM Journal on Numerical Analysis, IEEE Control Systems Magazine, Industrial and Engineering Chemistry Research, Optimal Control Applications and Methods, the IEEE Conference on Decision and Control, the American Control Conference, the European Control Conference, the IFAC Symposium on Nonlinear Control Systems, etc.

PUBLICATION RECORD

Journal Articles

1. Mathias, R., Weber, D.J., Thompson, K.A., Marshall, B.D., Finn, M.G., Scott, J.K., and Lively, R. P., "Framework for Predicting the Fractionation of Complex Liquid Feeds via Polymer Membranes," *Journal of Membrane Science*, **640**, 119767 (2021)

2. Shen, K., Robertson, D.L., and Scott, J.K., "Tight Reachability Bounds for Constrained Nonlinear Systems Using Mean Value Differential Inequalities," *Automatica*, **134**, 109911 (2021)

3. Rego, B.S., Scott, J.K., Raimondo, D.M., and Raffo, G.V., "Set-Valued State Estimation of Nonlinear Discrete-Time Systems with Nonlinear Invariants Based on Constrained Zonotopes," *Automatica*, **129**, 109638 (2021)

4. Chen, C.-C., Gorensek, M., Scott, J.K., Palou-Rivera, I., "Process Modeling of Intensified Chemical Processes," *Chemical Engineering Progress*, **166** (3), 35-42 (2020)

5. Shen, K. and Scott, J.K., "Exploiting Nonlinear Invariants and Path Constraints to Achieve Tighter Reachable Set Enclosures using Differential Inequalities," *Mathematics of Control, Signals, and Systems*, 10.1007/s00498-020-00254-y (2020)

6. Yang, X. and Scott, J.K., "Accurate Uncertainty Propagation for Discrete-Time Nonlinear Systems Using Differential Inequalities with Model Redundancy," *IEEE Transactions on Automatic Control*, 10.1109/TAC.2020.296824 (2020)

7. Rego, B.S., Raffo, G.V., Scott, J.K., and Raimondo, D.M., "Guaranteed Methods Based on Constrained Zonotopes for Set-Valued State Estimation of Nonlinear Discrete-Time Systems," *Automatica*, **111**, 108614 (2020)

8. Schaber, S.D., Scott, J.K., and Barton, P.I., "Convergence-order Analysis for Differential-Inequalities-Based Bounds and Relaxations of the Solutions of ODEs," *Journal of Global Optimization*, **73**(1), 113-151 (2019)

9. Liu, J., Laird, C.D., Scott, J.K., Watson, J.-P, and Castillo, A., "Global Solution Strategies for the Network-Constrained Unit Commitment Problem with AC Transmission Constraints," *IEEE Transactions on Power Systems*, **34** (2), 1139-1150 (2018)

10. **,** 378-384 (2018)

11. Shao, Y. and Scott, J.K., "Convex Relaxations for Global Optimization Under Uncertainty Described by Continuous Random Variables," *AIChE Journal*, **64**(8), 3023-3033 (2018)

12. Shen, K. and Scott, J.K., "Rapid and Accurate Reachability Analysis for Nonlinear Dynamic Systems by Exploiting Model Redundancy," *Computers and Chemical Engineering*, **106**, 596-608 (2017)

13. Hakizimana, A. and Scott, J.K., "Differentiability Conditions for Stochastic Hybrid Systems with Application to the Optimal Design of Microgrids," *Journal of Optimization Theory and Applications*, **173**, 658-682 (2017)

14. Raimondo, D.M., Marseglia, G.R, Braatz, R.D., Scott, J.K., "Closed-Loop Input Design for Guaranteed Fault Diagnosis using Set-Valued Observers," *Automatica*, **74**, 107-117 (2016)

15. Scott, J.K., Raimondo, D.M., Marseglia, G.R, and Braatz, R.D., "Constrained Zonotopes: A New Tool for Set-Based Estimation and Fault Detection," *Automatica*, **69**, 126-136 (2016)

16. Polo-Garzon, F., Scott, J.K., Bruce, D.A., "Microkinetic Model for the Dry Reforming of Methane on Rh Doped Pyrochlore Catalysts," *J. Catalysis,* **340**, 196-204 (2016)

17. Dix, S.T., Scott, J.K., Getman, R.B., Campbell, C.T., "Using Degrees of Rate Control to Improve Selective n-Butane Oxidation over Model MOF-Encapsulated Catalysts: Sterically-Constrained $Ag_3Pd(111)$," *Faraday Discussions*, **188**, 21-38 (2016)

18. Harwood, S.M., Scott, J.K., and Barton, P.I., "Bounds on Reachable Sets using Ordinary Differential Equations with Linear Programs Embedded," *IMA J. Mathematical Control and Information*, **33**, 519-541 (2016)

19. Wechsung, A., Watson, H., Scott, J.K., and Barton, P.I., "Reverse Propagation of McCormick Relaxations," *J. Global Optimization*, **63**, 1-36 (2015)

20. Scott, J.K. and Barton, P.I., "Reachability Analysis and Deterministic Global Optimization of DAE Models," *Surveys in Differential-Algebraic Equations III*, 61-116 (2015)

21. Stuber, M.D., Scott, J.K., and Barton, P.I., "Convex and Concave Relaxations of Implicit Functions," *Optimization Methods and Software*, **30**, 424-460 (2015)

22. Scott, J.K., Findeisen, R., Braatz, R.D., and Raimondo, D.M., "Input Design for Guaranteed Fault Diagnosis Using Zonotopes," *Automatica*, **50**, 1580-1589 (2014)

23. Scott, J.K., and Barton, P.I., "Convex and Concave Relaxations for the Parametric Solutions of Semi-Explicit Index-One Differential-Algebraic Equations," *Journal of Optimization Theory and Applications*, **156**, 617-649 (2013)

24. Scott, J.K., and Barton, P.I., "Interval Bounds on the Solutions of Semi-Explicit Index-One DAEs. Part 1: Analysis," *Numerische Mathematik*, **125**, 1-25 (2013)

25. Scott, J.K., and Barton, P.I., "Interval Bounds on the Solutions of Semi-Explicit Index-One DAEs. Part 2: Computation*," Numerische Mathematik*, **125**, 27-60 (2013)

26. Scott, J.K., and Barton, P.I., "Bounds on the Reachable Sets of Nonlinear Control Systems," *Automatica*, **49**, 93-100 (2013)

27. Scott, J.K., and Barton, P.I., "Improved Relaxations for the Parametric Solutions of ODEs using Differential Inequalities," *Journal of Global Optimization*, **57**, 143-176 (2013)

28. Scott, J.K., Chachuat, B., and Barton, P.I., "Nonlinear Convex and Concave Relaxations for the Solutions of Parametric ODEs," *Optimal Control Applications and Methods*, **34**, 145-163 (2013)

29. Scott, J.K., Stuber, M.D., and Barton, P.I., "Generalized McCormick Relaxations," *Journal of Global Optimization*, **51**, 569-606 (2011)

30. Scott, J.K., and Barton, P.I., "Tight, Efficient Bounds on the Solutions of Chemical Kinetics Models," *Computers and Chemical Engineering*, **34**, 717-731 (2010)

Refereed Conference Proceedings

1. Mu, B., Yang, X., Shen, K., and Scott, J.K., "Improved Interval Reachability Bounds for Nonlinear Discrete-Time Systems using an Efficient One-Dimensional Partitioning Method," *Proceedings of the 2021 American Control Conference,* 3664-3669 (2021)

2. Shen, K. and Scott, J.K., "Mean Value Form Enclosures for Nonlinear Reachability Analysis," *Proceedings of the 57th IEEE Conference on Decision and Control* (2018)

3. Yang, X. and Scott, J.K., "Accurate Set-Based State Estimation for Nonlinear Discrete-Time Systems using Differential Inequalities with Model Redundancy," *Proceedings of the 57th IEEE Conference on Decision and Control* (2018)

4. Shao, Y., Robertson, D., and Scott, J.K., "Convex Relaxations for Nonlinear Stochastic Optimal Control Problems," *Proceedings of the 2018 American Control Conference* (2018)

5. Yang, X. and Scott, J.K., "Efficient Reachability Bounds for Discrete-Time Nonlinear Systems by Extending the Continuous-Time Theory of Differential Inequalities," *Proceedings of the 2018 American Control Conference* (2018)

6. Shen, K. and Scott, J.K., "Tight Reachability Bounds for Nonlinear Systems using Nonlinear and Uncertain Solution Invariants," *Proceedings of the 2018 American Control Conference* (2018)

7. Marseglia, G.R., Scott, J.K., Magni, L., Braatz, R.D., and Raimondo, D.M., "A Hybrid Stochastic-Deterministic Approach for Active Fault Diagnosis Using Scenario Optimization," *Proceedings of the 19th IFAC World Congress* (2014)

8. Scott, J.K., Marseglia, G.R., Magni, L., Braatz, R.D., and Raimondo, D.M., "A Hybrid Stochastic-Deterministic Input Design Method for Active Fault Diagnosis," *Proceedings of the 52nd IEEE Conference on Decision and Control* (2013)

9. Raimondo, D.M., Marseglia, G.R., Braatz, R.D., and Scott, J.K., "Fault-Tolerant Model Predictive Control with Active Fault Isolation," *Proceedings of the 2nd International Conference on Control and Fault Tolerant Systems*, 444-449 (2013)

10. Harwood, S., Scott, J.K., and Barton, P.I., "Bounds on Reachable Sets Using Ordinary Differential Equations with Linear Programs Embedded," *Proceedings of the 9th IFAC Symposium on Nonlinear Control*, **9**, 62-67 (2013)

11. Raimondo, D.M., Braatz, R.D., Scott, J.K., "Active Fault Diagnosis using Moving Horizon Input Design," *Proceedings of the 2013 European Control Conference*, 3131-3136 (2013)

12. Scott, J.K., Raimondo, D.M., Findeisen, R., and Braatz, R.D., "Design of Active Inputs for Set-Based Fault Diagnosis," *Proceedings of the 2013 American Control Conference*, 3567-3572 (2013)

13. Scott, J.K. and Barton, P.I., "Convex Relaxations for Nonconvex Optimal Control Problems," *Proceedings of the 50th IEEE Conference on Decision and Control*, 1042-1047 (2011)

14. Scott, J.K. and Barton, P.I., "Convex Enclosures for the Reachable Sets of Nonlinear Parametric Ordinary Differential Equations," *Proceedings of the 49th IEEE Conference on Decision and Control*, 5695-5700 (2010)

15. Scott, J.K. and Barton, P.I., "Tight, Efficient Bounds on the Solutions of Chemical Kinetics Models," *Proceedings of the 19th European Symposium on Computer Aided Process Engineering*, **26**, 937-941 (2009)

Conference Presentations (w/o Published Proceedings)

1. Mu, B., Yang, X., and Scott, J.K., "Fault Detection in Uncertain Nonlinear Chemical Systems: A Comparison of Advanced Set-Based Methods with Conventional Data-Driven and Observer-Based Methods", Annual Meeting of the American Institute of Chemical Engineers (AIChE), Boston, MA (November 2021)

2. Kim T. and Scott, J.K., "Totally Open Pressure Swing Adsorption Intensification Laboratory (toPSAil)", Annual Meeting of the American Institute of Chemical Engineers (AIChE), Boston, MA (November 2021)

3. Ye J. and Scott, J.K., "An Improved Implementation of the RPD Method for Computing Convex Relaxations for Global Dynamic Optimization", Annual Meeting of the American Institute of Chemical Engineers (AIChE), Boston, MA (November 2021)

4. Kim T. and Scott, J.K., "A Procedure for Identifying a Nearly Pareto-Optimal Operation Policy for Pressure Swing Adsorption Processes (Poster)", Annual Meeting of the American Institute of Chemical Engineers (AIChE), Boston, MA (November 2021)

5. Tabb J., Kim T., and Scott, J.K., "Animated Interactive Data Visualization Tool for Pressure Swing Adsorption Simulations (Poster)", Annual Meeting of the American Institute of Chemical Engineers (AIChE), Boston, MA (November 2021)

6. Weber D., Chen, C.-C., and Scott, J.K., "A Critical Comparison of Numerical Methods for Solving Coupled Multicomponent Fluxes for Complex Mixtures Across Asymmetric Membranes", Annual Meeting of the American Institute of Chemical Engineers (AIChE), Boston, MA (November 2021)

7. Robertson, D.L., Cheng, P., and Scott, J.K., "Convergence Order Analysis for Decomposition Methods for Global Nonconvex Stochastic Optimization," World Congress on Global Optimization, Virtual (July 2021)

8. Ye, J. and Scott, J.K., "Improved Convex Relaxations with Dynamic Cuts for Global Dynamic Optimization," World Congress on Global Optimization, Virtual (July 2021)

9. Ye, J. and Scott, J.K., "Enhanced Convex Relaxations for Global Dynamic Optimization Using Invariants and Dynamic Cuts," Annual Meeting of the Society for Industrial and Applied Mathematics (SIAM), Virtual (March 2021)

10. Robertson, D.L., Cheng, P., and Scott, J.K., "Convergence Rate Analysis for Schemes of Relaxations in Decomposition Methods for Global Nonconvex Stochastic Optimization", CAST division plenary, Annual Meeting of the American Institute of Chemical Engineers (AIChE), Virtual (November 2020)

11. Weber, D. and Scott, J.K., "On the Numerical Solution of Rigorous Membrane Module Models Involving Nonideal Multicomponent Mixtures," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Virtual (November 2020)

12. Mu, B., Yang, X., and Scott, J.K., "Comparison of Advanced Set-Based Fault Detection Methods with Classical Data-Driven and Observer-Based Methods for Nonlinear and Uncertain Chemical Processes (Poster)," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Virtual (November 2020)

13. Ye, J. and Scott, J.K., "Modified McCormick Relaxation Rules for Handling Infeasibility in Relaxation-Based Iterative Domain Reduction Methods (Poster)," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Virtual (November 2020)

14. Kim, T. and Scott, J.K., "Dynamic Modeling of Pressure Swing Adsorption Processes (Poster)," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Virtual (November 2020)

15. Weber, D. and Scott, J.K., "An Efficient and Reliable Numerical Method for Computing Coupled Multicomponent Fluxes for Complex Mixtures Across Asymmetric Membranes," Spring Meeting of the American Institute of Chemical Engineers (AIChE), Virtual (August 2020)

16. Shao, Y. and Scott, J.K., "Strengthened SOCP Relaxation and Efficient Hybrid Bounds Tightening Scheme for the Global Solution of AC Optimal Power Flow Problems," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Orlando, FL (November 2019)

17. Kim, T., Sees, M., Kirkes, T., Chen, C.-C., and Scott, J.K., "A 'valve-free' Model for Dynamic Simulation of Pressure Swing Adsorption Processes that Automatically Determines Near-Optimal Operational Policies," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Orlando, FL (November 2019)

18. Sees, M., Kirkes, T., Kim, T., Scott, J.K., and Chen, C.-C., "Simulation of Pressure Swing Adsorbers Using the Moving Bed Model," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Orlando, FL (November 2019)

19. Hakizimana, A. and Scott, J.K., "A Novel Optimization Approach for the Integrated Design and Operation of Flexible Manufacturing Systems," Foundations of Computer-Aided Process Design (FOCAPD), Copper Mountain, CO (July 2019)

20. Kim, T., Tabb, J., and Scott, J.K., "Design and Dynamic Simulation of Near-Optimal, Adsorbent-Specific PSA Cycles for Improved Adsorbent Screening" (poster), Foundations of Computer-Aided Process Design (FOCAPD), Copper Mountain, CO (July 2019)

21. Kim, T., Tabb, J., and Scott, J.K., "Rational screening of adsorbents for natural gas upgrading by pressure swing adsorption using dynamic simulation of process performance metrics," Spring Meeting of the American Institute of Chemical Engineers (AIChE), New Orleans, LA (April 2019)

22. Sees, M., Kirkes, T., Kim, T., Scott, J.K., and Chen, C.-C., "Modelling of gas separations by pressure swing adsorption using a novel steady-state methodology", Spring Meeting of the American Institute of Chemical Engineers (AIChE), New Orleans, LA (April 2019)

23. Sees, M., Kirkes, T., Kim, T., Scott, J.K., and Chen, C.-C., "Novel Steady State Process Modeling Methodology for Pressure Swing Adsorption," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Pittsburg, PA (October 2018)

24. Shao, Y. and Scott, J.K., "A Global Optimization Algorithm for Nonconvex Chance-Constrained Programs with Continuous Random Variables," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Pittsburg, PA (October 2018)

25. Yang, X. and Scott, J.K., "An Improved Set-Based State Estimation Method for Fault Detection and Diagnosis in Highly Nonlinear and Uncertain Chemical Processes," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Pittsburg, PA (October 2018)

26. Beitz, A. and Scott, J.K., "On the Value of Global Optimality in Machine Learning Problems: The Case of Feature Selection for Linear Support Vector Machines," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Pittsburg, PA (October 2018)

27. Shen, K., Yang, X., and Scott, J.K., "Verifying Performance Specifications for Dynamic Processes Under Uncertainty Using Backward Reachability Analysis," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Pittsburg, PA (October 2018)

28. Kim, T., Tabb, J., and Scott, J.K., "Dynamic Modeling of Kinetically Driven Pressure Swing Adsorption for Natural Gas Upgrading (Poster)," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Pittsburg, PA (October 2018)

29. Shao, Y. and Scott, J.K., "Guaranteed Global Optimization of Expected-Value Minimization Problems with Continuous Random Variables," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Minneapolis, MN (October 2017)

30. Yang, X. and Scott, J.K., "Rapid and Accurate Fault Detection and Diagnosis for Uncertain Nonlinear Systems Using Advanced Set-Based State Estimation Techniques," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Minneapolis, MN (October 2017)

31. Hakizimana, A. and Scott, J.K., "Efficient Solution of Mixed-Integer Multistage Stochastic Programs for the Optimal Design of Smart Manufacturing Systems Using 'Smooth-in-Expectation' Decision Rules," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Minneapolis, MN (October 2017)

32. Shen, K. and Scott, J.K., "Improved Bounds on the Solutions of Nonlinear Dynamic Systems Using Centered-Form Differential-Inequalities," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Minneapolis, MN (October 2017)

33. Hakizimana, A. and Scott, J.K., "Effective Variance Reduction and Gradient Estimation Techniques for Stochastic Simulation and Optimization of Microgrids," Annual Meeting of the American Institute of Chemical Engineers (AIChE), San Francisco, CA (November 2016)

34. Shen, K. and Scott, J.K., "Rapid and Accurate Uncertainty Propagation for Nonlinear ODEs using Nonlinear Solution Invariants," Annual Meeting of the American Institute of Chemical Engineers (AIChE), San Francisco, CA (November 2016)

35. Scott, J.K., "Constrained Zonotopes: A New Tool for Set-Based Computations", Annual Meeting of the American Institute of Chemical Engineers (AIChE), Salt Lake City, UT (November 2015)

36. Scott, J.K., "On the Optimal Sizing and Dispatch Problem for Microgrids with Stochastic Generators – When is the Expected-Cost Differentiable?", Annual Meeting of the American Institute of Chemical Engineers (AIChE), Salt Lake City, UT (November 2015)

37. Scott, J.K., "Improved Interval Bounds on the Solutions of General Nonlinear ODEs Using Lifted Models with Manufactured Solution Invariants", Annual Meeting of the American Institute of Chemical Engineers (AIChE), Salt Lake City, UT (November 2015)

38. Scott, J.K., "Towards Gradient-Based Algorithms for Optimal Design of Hybrid Renewable Energy Systems with Stochastic Generators, Storage, and Discrete Control Logic", Annual Meeting of the American Institute of Chemical Engineers (AIChE), Atlanta, GA (November 2014)

39. Scott, J.K., Raimondo, D., and Braatz, R.D., "Input Design for Active Fault Diagnosis using Zonotopes", Annual Meeting of the American Institute of Chemical Engineers (AIChE), Atlanta, GA (November 2014)

40. Scott, J.K. and Barton, P.I., "Improved Relaxations for Global Optimization with ODEs and DAEs embedded", Annual Meeting of the American Institute of Chemical Engineers (AIChE), Pittsburg, PA (October 2012)

41. Scott, J.K. and Barton, P.I., "Interval Bounds on the Solutions of Semi-Explicit Index-One DAEs," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Minneapolis, MN (October 2011)

42. Scott, J.K. and Barton, P.I., "Deterministic Global Optimization with Differential-Algebraic Equations Embedded," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Minneapolis, MN (October 2011)

43. Scott, J.K. and Barton, P.I., "Interval Bounds on the Solutions of Semi-Explicit Index-One DAEs," The International Conference on Scientific Computation and Differential Equations, Toronto, Ontario (July 2011)

44. Scott, J.K. and Barton, P.I., "Relaxation Methods for Programs with ODEs and DAEs Embedded," 2nd World Congress on Global Optimization, Chania, Greece (July 2011)

45. Scott, J.K. and Barton, P.I., "Rigorous Convex Enclosures of the Reachable Sets of Nonlinear ODEs under Uncertainty," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Salt Lake City, UT (November 2010)

46. Scott, J.K. and Barton, P.I., "Deterministic Global Optimization of Processes Described by Nonlinear Differential-Algebraic Equations," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Salt Lake City, UT (November 2010)

47. Scott, J.K. and Barton, P.I., "Nonlinear Convex and Concave Relaxations for the Solutions of Parametric ODEs," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Nashville, TN (November 2009)

48. Scott, J.K. and Barton, P.I., "Tight Interval Bounds for the Parametric Solutions of Systems Biology Models," Annual Meeting of the American Institute of Chemical Engineers (AIChE), Nashville, TN (November 2009)

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