

Curriculum Vitae

Ali Mohammad Sahlodin, PhD (علي محمد سهيل الدين)

Assistant Professor of Chemical Engineering at [Amirkabir University of Technology](#)

Research Affiliate at [Massachusetts Institute of Technology](#)

E-mail: sahlodin@aut.ac.ir, sahlodin@mit.edu

Google Scholar: <http://scholar.google.com/citations?user=ov01VLQAAAAJ&hl=en>

LinkedIn: <http://www.linkedin.com/pub/ali-mohammad-sahlodin/20/9b0/234>

Research Background: Process Modeling and Simulation, Optimization, and Advanced Process Control.

Areas of Specialty and Interest

- Advanced Process Control (Real-time Optimization, MPC, and economic MPC).
- Steady-state and Dynamic Process Modeling and Simulation.
- Process Optimization Techniques and Software.
- Advanced Numerical Methods (linear and nonlinear methods, rigorous solution of parametric dynamic systems, differential-algebraic equations and hybrid dynamic systems).
- Air Pollution Modeling.

Professional Experience

Aspen Technology (Bedford, MA, USA)

Jan. 2016-Aug. 2018

Senior Engineer (R&D), Process Modeling Infrastructure

- Process modeling and software development.
- Key contributor in major HYSYS Dynamics developments including new control features and dynamic solver enhancements (versions 9-11).
- Contributed to other HYSYS enhancement projects including the new Equation-Oriented environment.

Massachusetts Institute of Technology

Jan. 2016-Present

Research Affiliate

Massachusetts Institute of Technology

Jul. 2013-Dec 2015

Novartis-MIT Center for Continuous Manufacturing

Postdoctoral Associate

- Developed software tools and efficient solution strategies for optimal manufacturing of pharmaceuticals.
- Applied the software to a hybrid differential-algebraic model of a continuous tablet manufacturing plant.
- Result: Significant decrease in the off-specification drug production.

McMaster Advanced Control Consortium (MACC), McMaster University Jan. 2013-Jul. 2013

Research Associate

- Developed an economic-driven model predictive control strategy.
- Result: Significant increase in the transient economic performance of the process.

- Developed novel algorithms for efficient global optimization of dynamic processes.
- Implemented the novel algorithms with the C++ programming language.
- Result: Reducing the CPU time of existing global optimization algorithms by orders of magnitude.
- Direct application in guaranteed **parameter estimation** and model discrimination.

Education

- PhD**
Sept 2008-Dec 2012
- Program:** Chemical Engineering
Thesis: Global Optimization of Dynamic Process Systems using Complete Search Methods.
Institution: [McMaster Advanced Control Consortium](#) (MACC), Department of Chemical Engineering, [McMaster University](#), Hamilton, ON, Canada.
Supervisors: [Dr. Benoît Chachuat](#), [Dr. Prashant Mhaskar](#).
- M.Sc.**
Sept 2005-Nov 2007
- Program:** Chemical Engineering- Process Modeling, Simulation, and Control
Thesis: Real-time Optimization of Processes with Dynamic Performance Considerations: Tennessee Eastman Benchmark.
Institution: Faculty of Chemical and Petroleum Engineering, [Sharif University of Technology](#), Tehran, Iran.
Supervisor: [Dr. Ramin B. Boozarjomehry](#),
GPA: 17.58/20
- B.Sc.**
Sept 2001-July 2005
- Program:** Chemical Engineering- Process Design
Thesis: Modeling of Vehicular Pollution Dispersion Near Roadways.
Institution: Faculty of Chemical Engineering, [University of Tehran](#), Tehran, Iran
Supervisor: [Dr. Rahmat Sotudeh-Gharebagh](#) (with the collaboration of [Dr. Yifang Zhu](#) from UCLA, USA)
GPA: 17.64/20 (*Ranked 1st in the Department*)

Publications

Published Journal Papers:

- Ali M. Sahlodin, Paul Barton (2017). [Efficient Control Discretization based on Turnpike Theory for Dynamic Optimization](#). *Processes*, 5(4), 85. *Google Scholar Citations 1*.
- Ali M. Sahlodin, Harry A.J. Watson, Paul Barton (2016). [Nonsmooth Model for Dynamic Simulation of Phase Changes](#). *AIChE Journal*, 62 (9): 3334–3351. *Google Scholar Citations 17*.
- Ali M. Sahlodin, Paul Barton (2015). [Optimal Campaign Continuous Manufacturing](#). *Ind. Eng. Chem. Res.*, 54 (45), 11344–11359. *Google Scholar Citations 18*.
- Ali M. Sahlodin, Benoît Chachuat, (2011). [Discretize-then-relax approach for convex/concave relaxations of the solutions of parametric ODEs](#). *Applied Numerical Mathematics*, 61 (7): 803-820. *Google Scholar Citations 31*.
- A.M. Sahlodin, B. Chachuat, (2011). [Convex/concave relaxations of parametric ODEs using Taylor models](#). *Computers & Chemical Engineering*, 35 (5): 844-857. *Google Scholar Citations: 49*.
- M. Golshan, R.B. Boozarjomehry, A.M. Sahlodin, M.R. Pishvaie (2011). [Fuzzy real-time optimization of the Tennessee Eastman challenge process](#). *Iranian Journal of Chemistry and Chemical Engineering* (English edition, *ISI-indexed*), 30 (3): 31-44.
- Ali M. Sahlodin, Rahmat Sotudeh-Gharebagh, Yifang Zhu (2007). [Modeling of dispersion near roadways based on the vehicle-induced turbulence concept](#). *Atmospheric Environment*, 41 (1): 92-102. *Google Scholar Citations: 44*.

Refereed International Conference Proceedings:

- Ali M. Sahlodin, Benoît Chachuat (2011). [Tight Convex and Concave Relaxations via Taylor Models for Global Dynamic Optimization](#). *Computer Aided Chemical Engineering*, 29: 537-541. *Google Scholar Citations: 1*.

- **Ali M. Sahlodin**, Benoît Chachuat (2010), [Discretize-then-relax approach for state relaxations in global dynamic optimization](#). Computer Aided Chemical Engineering, 28: 427–432. *Google Scholar Citations: 4*.
- **Ali Sahlodin**, [Mohammad Shahrokhi](#) (2008), [Adaptive sliding mode control of a pH process](#). In proceedings of the 5th International Chemical Engineering Congress (IChEC 2008), Kish Island, Iran.

PhD Thesis

- **Ali M. Sahlodin** (2012). [Global Optimization of Dynamic Process Systems using Complete Search Methods](#). McMaster University, Canada. *Google Scholar Citations: 11*.

Selected Conference Presentations and Talks:

- **A.M. Sahlodin**, [Continuous Manufacturing of Pharmaceuticals: Challenges and Opportunities](#). Talk at University of Tehran, organized by National Elites Foundation, July 2017.
- **Oral presentation: A.M. Sahlodin**, Paul I. Barton. [Optimal Campaign Continuous Manufacturing](#). 15th Annual Meeting of American Institute of Chemical Engineers, Salt Lake City, USA, November 2015.
- **Oral presentation:** Paul I. Barton, **A.M. Sahlodin**. Optimal Campaign Continuous Manufacturing of Pharmaceuticals. 29th INTERNATIONAL FORUM AND EXHIBITION PROCESS ANALYTICAL TECHNOLOGY (IFPAC 2015), Arlington, Virginia, January 2015.
- **Oral presentation: A.M. Sahlodin**, Paul I. Barton. Optimal Startup of a Continuous Pharmaceutical Process. 14th Annual Meeting of American Institute of Chemical Engineers, Atlanta, USA, November 2014.
- **Oral presentation:** Kamil A. Khan, **A.M. Sahlodin**, Paul I. Barton. Verifying Differentiability of Solutions of Nonsmooth Dynamic Systems. 14th Annual Meeting of American Institute of Chemical Engineers, Atlanta, USA, November 2014.
- **Poster presentation: Ali M. Sahlodin**, Paul I. Barton. Startup Optimization of Crystallization Units in a Continuous Pharmaceutical Plant. [International Symposium on Continuous Manufacturing of Pharmaceuticals](#), Cambridge, USA, May 2014.
- **Oral presentation: A.M. Sahlodin**, B. Chachuat, and P. Mhaskar. Efficient Global Dynamic Optimization of Chemical Processes. McMaster University Chemical Engineering Conference, April 2012.
- **Oral presentation:** B. Chachuat and **A.M. Sahlodin**. Polyhedral Relaxations for the Solutions of Parametric ODEs in Global Dynamic Optimization. Second World Congress on Global Optimization in Engineering & Science, Chania, Greece, July 2011.
- **Oral presentation: A.M. Sahlodin**, B. Chachuat, and P. Mhaskar. Toward Efficient Global Dynamic Optimization, Statistics and Control Meeting, University of Laval, Quebec City, May 2011.
- **Oral presentation: A.M. Sahlodin** and B. Chachuat, Advances in Global Dynamic Optimization, Statistics and Control Meeting, University of Waterloo, May 2010.
- **Oral presentation (invited):** Benoît Chachuat, **Ali M. Sahlodin**. A Discretize-then-relax Approach for Convex/Concave Relaxation of the Solutions of Parametric ODEs; 20th International Symposium on Mathematical Programming, Chicago, August 2009.

Teaching Experience

- **University Courses (AmirKabir University of Technology)**
 - **Graduate**
 - Process modeling and simulation (2018)
 - **Undergraduate**
 - Process dynamics and control (2018)
- **Teaching Assistant (2007-2012)**
 - **McMaster University (2009-2012)**

Courses:

 - Optimization in Chemical Engineering (winter 2011/2012) (*Awarded best TA prize.*)
 - Process Model Formulation and Solution (Fall 2010)
 - Simulation, Modeling, and Problem Solving (Winter 2010)
 - Introduction to Reactor Design (Winter 2009)
 - **Sharif University of Technology (2007-2008)**

Course: Process Control Laboratory (summer and fall 2007, winter 2008).

- **Leading Industrial Training Workshops (2006-2008)**
Locations: University of Tehran in Tehran, Iran.
 - **Description:** Courses intended to train engineers in computer-aided *process simulation, control, and optimization*. Developed course materials based on industrial needs, using a problem-based learning approach.

Supervisory Experience

- **Co-advisor, MSc Thesis (2016-2018)**
Location: University of Tehran, Tehran, Iran.
Description: Prediction of ultrafine particles concentrations inside vehicle cabins; jointly with [Dr. R. Sotudeh-Gharebagh](#).
- **Co-advisor, BSc Thesis (2007-2008)**
Location: University of Tehran, Tehran, Iran.
Description: Prediction of carbon monoxide concentrations inside vehicle cabins; jointly with [Dr. R. Sotudeh-Gharebagh](#).

Experimental Research Experience

- **Testing of a Nonlinear Algorithm for pH Control (Fall 2007)**
Location: Sharif University of Technology, Tehran, Iran.
Description: Laboratory testing of a self-developed nonlinear sliding mode controller to a pH control system.

Referee Experience

- [Scientica Iranica \(2018\)](#)
- [Optimal Control Applications and Methods \(2016\)](#)
- [Journal of Global Optimization \(2014\)](#).
- [Journal of Process Control \(2013\)](#).
- [Chemical Product and Process Modeling journal \(2012-2015\)](#).
- [Computer Aided Chemical Engineering \(2010\)](#).
- [Atmospheric Environment journal \(2008\)](#).

Trainee Experience

- **Co-op Trainee (summer 2004)**
Location: Shiraz Oil Refinery, Shiraz, Iran
Responsibilities: Gaining hands-on experience on different units in a refinery, performing mass/energy balance on process units, and writing reports.

Organizational Experience

- **MACC Seminar Coordinator and Chairman (2009-2012)**
Location: McMaster University, Hamilton, ON, Canada.
Description: This is a seminar series where MACC graduate students present their research and latest results to other students and the faculty members.
- **MACC Meeting Registrar (May 2011, May 2012, May 2013)**
Location: Hamilton Convention Center, Hamilton, ON, Canada.
Description: The MACC Meetings are held annually, where the MACC industrial partners participate in a multiple-day workshop organized by MACC in order to exchange the latest ideas and research results.
- **Statistics and Control Conference Registrar (May 2012)**
Location: McMaster University, Hamilton, ON, Canada.
Description: The conference is held annually, where students and professors from process systems engineering groups within Ontario and Québec meet and present their latest research results.

Honors and Awards

- **International Excellence Award, McMaster University (2011-2012).**

- **Outstanding Teaching Assistant Award**, Course: Optimization in Chemical Engineering, McMaster University (April 2012).
- **Best Poster Competition Prize**, MACC Annual Meeting (May 2012).
- **Ranked 1st** among around 80 B.Sc. students in the Chem. Eng. Department, University of Tehran (2001-2005).
- **Faculty of Eng. Prize** (for outstanding students) for three years in a row, University of Tehran (2002-2005).
- **Ranked 5th** out of 867 participants in the Nationwide Biotechnology Graduate Entrance Exam, Iran (2005).
- Member of the National Elite Foundation (2007).

Professional Software Skills

- *Programming*: C++, FORTRAN, MATLAB.
- *Modeling and optimization*: GAMS, IPOPT, SNOPT, CPLEX, Gurobi.
- *Process simulation*: Aspen Plus, Aspen HYSYS, JACOBIAN, Simulink.

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