

# Michael W. Fisher

🌐 URL: <http://control.ee.ethz.ch/people/profile.michael-fisher.html>

## Appointments

- 2020 – current **Postdoctoral Researcher**  
ETH Zürich  
Automatic Control Laboratory  
Power Systems Laboratory  
Department of Information Technology and Electrical Engineering  
Professor Florian Dörfler and Professor Gabriela Hug
- 2013, 2014 **Summer Research Internships**  
Los Alamos National Laboratory  
Center for Nonlinear Studies  
Dr. Misha Chertkov and Dr. Scott Backhaus
- 2012 **Summer Research Internship**  
Lawrence Berkeley National Laboratory  
BELLA Center (Formerly: LOASIS)  
Dr. Cameron Geddes and Dr. Jean-Luc Vay

## Education

- Sep 2014 – Jan 2020 **University of Michigan - Ann Arbor**  
Ph.D. Electrical Engineering: Systems  
M.S. Mathematics (2017)  
Advisor: Professor Ian Hiskens  
GPA: 4.0/4.0  
Thesis: Stability of Nonlinear Systems with Parameter Uncertainty
- Sep 2010 – May 2014 **Swarthmore College**  
B.A. Mathematics, Physics  
GPA: 3.8/4.0

## Awards

- 2019 Outstanding Student Paper Award, IEEE Conference on Decision and Control
- 2019 One of Three Students Selected by the ECE Department for Nomination for the University of Michigan Rackham Predoctoral Fellowship
- 2018 Selected as the University of Michigan Representative to 2018 Seminar for the Next Generation of Researchers in Power Systems
- 2017 Top Four Finalist for Best Student Paper Award, IEEE Conference on Decision and Control
- 2016 National Science Foundation 2016 Graduate Research Fellowship Program Honorable Mention
- 2015 Best Poster Award, Engineering Graduate Symposium, University of Michigan, Ann Arbor
- 2015 National Science Foundation 2015 Graduate Research Fellowship Program Honorable Mention
- 2012 Barry M. Goldwater Scholarships Honorable Mention
- 2011 CRC Press Chemistry Achievement Award, Taylor and Francis Group, LLC

## Research Interests

1. Distributed control in autonomous multi-agent systems and energy systems.
2. Nonlinear stability analysis and control of complex systems.
3. Security assessment in cyber-physical systems and smart power grids.

## Journal Publications

M. W. Fisher and I. A. Hiskens. Hausdorff Continuity of Region of Attraction Boundary Under Parameter Variation with Application to Disturbance Recovery. *SIAM Journal of Applied Dynamical Systems*. To appear.

M. W. Fisher and I. A. Hiskens. Comments on "Stability Regions of Nonlinear Autonomous Dynamical Systems." *IEEE Transactions on Automatic Control*. To appear.

S. Misra, M. W. Fisher, S. Backhaus, R. Bent, M. Chertkov, F. Pan. Optimal Compression in Natural Gas Networks: A Geometric Programming Approach. *IEEE Transactions on Control of Network Systems*, 2(1):47-56, 2014.

## Under Review

V. Häberle, M. W. Fisher, E. Prieto-Araujo, and F. Dörfler. Control Design of Dynamic Virtual Power Plants - An Adaptive Divide-and-Conquer Approach. Submitted to *IEEE Transactions on Power Systems*.

## Working Journal Papers

M. W. Fisher, F. Dörfler, and G. Hug. Approximation by Simple Poles in System Level Synthesis for Optimal Control Design Without Deadbeat Control.

M. W. Fisher and I. A. Hiskens. Conditions for Entry of Nonwandering Points Into Region of Attraction Boundary Under Strong  $C^1$  Perturbations.

## Conference Publications

M. W. Fisher and I. A. Hiskens. Numerical Computation of Critical System Recovery Parameter Values by Trajectory Sensitivity Maximization. In *IEEE Conference on Decision and Control*, p. 8000-8006, 2019.

M. W. Fisher and I. A. Hiskens. Parametric Dependence of Large Disturbance Response for Vector Fields with Event-Selected Discontinuities. In *European Control Conference*, p. 166-173, 2019

M. W. Fisher and I. A. Hiskens. Numerical Computation of Critical Parameter Values for Fault Recovery in Power Systems. In *Power Systems Computation Conference*, p. 1-6, 2018

M. W. Fisher and I. A. Hiskens. Parametric Dependence of Large Disturbance Response and Relationship to Stability Boundary. In *IEEE Conference on Decision and Control*, p. 1821-1827, 2017.

M. W. Fisher and I. A. Hiskens. Numerical Computation of Parameter-Space Stability/Instability Partitions for Induction Motor Stalling. In *IFAC Workshop on Control of Transmission and Distribution Smart Grids*, p. 250-255, 2016.

M. W. Fisher and I. A. Hiskens. Phase Boundary Computation for Fault Induced Delayed Voltage Recovery. In *IEEE Conference on Decision and Control*, p. 3278-3284, 2015.

M. Chertkov, M. W. Fisher, S. Backhaus, R. Bent, S. Misra. Pressure Fluctuations in Natural Gas Networks caused by Gas-Electric Coupling. In *Hawaii International Conference on System Sciences*, p. 2738-2747, 2014

## Mentoring and Teaching

- 2020-present PhD Student Supervision
- Verena Häberle (co-advised with Florian Dörfler)  
*Project: Decentralized control of heterogeneous power generation sources in a dynamic virtual power plant.*
- 2021 Master Thesis Supervision
- Francisco Canales  
*Project: Constrained control design for dynamic virtual power plants.*
  - Moritz Danninger (co-advised with Johanna Vorwerk)  
*Project: Optimization-based nonlinear control of inverter-interfaced thermal loads.*
- 2020 Semester Project Supervision
- Simon Schnellmann (co-advised with Johanna Vorwerk)  
*Project: Assessing nonlinear stability of inverter-interfaced demand response.*
  - Panagiotis Grontas  
*Project: Dynamic tracking for distributed and adaptive control of dynamic virtual power plants.*
- 2018 Guest Lecturer
- Nonlinear Dynamics and Control  
*Graduate course at University of Michigan - Ann Arbor*
- 2021 Guest Lecturer
- Power System Dynamics, Control, and Operation  
*Graduate course at ETH Zürich*
- 2018 Graduate Student Instructor
- Nonlinear Dynamics and Control  
*Graduate course at University of Michigan - Ann Arbor*
- 2020 Teaching Assistant
- Control Systems 1  
*Undergraduate course at ETH Zürich*
- 2021 Teaching Assistant
- Power System Dynamics, Control, and Operation  
*Graduate course at ETH Zürich*

## Conference Presentations

- 2019 Conference on Decision and Control, Nice, France
- 2019 European Control Conference, Naples, Italy
- 2018 Power Systems Computation Conference, Dublin, Ireland
- 2017 Conference on Decision and Control, Melbourne, Australia
- 2016 IFAC Workshop on Control of Transmission and Distribution Smart Grids, Prague, Czech Republic
- 2015 Conference on Decision and Control, Osaka, Japan

## Invited Workshops and Seminars

- 2020 Workshop on Emerging Challenges in Stability, Control, and Optimization of Power Systems - Stability Assessment and Closed-Loop Control, European Control Conference, Virtual
- 2018 Seminar for the Next Generation of Researchers in Power Systems, Banff, Canada
- 2014 Grid Science Student Seminar Series, Los Alamos National Laboratory, Los Alamos, New Mexico
- 2013 Center for Nonlinear Studies Seminar Series, Los Alamos National Laboratory, Los Alamos, New Mexico
- 2012 LOASIS Group, Lawrence Berkeley National Laboratory, Berkeley, California

## Professional Services and Affiliations

Member of the Institute for Electrical and Electronics Engineers (IEEE)

- *IEEE Societies: Control Systems Society, Power and Energy Society*

Member of the Society for Industrial and Applied Mathematics (SIAM)

Reviewer for:

- *IEEE Transactions on Automatic Control*
- *IEEE Transactions on Power Systems*
- *IEEE Transactions on Smart Grid*