

Michael W. Fisher

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Appointments

- 2022 – present **Assistant Professor**
University of Waterloo
Department of Electrical and Computer Engineering
Dynamics, Optimization, and Control of Complex Systems (DOCS) Group
- 2020 – 2022 **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

Preprints

M. W. Fisher, G. Hug, and F. Dörfler. Approximation by Simple Poles – Part I: Density and Geometric Convergence Rate in Hardy Space. Submitted to *IEEE Transactions on Automatic Control*, 2022.

M. W. Fisher, G. Hug, and F. Dörfler. Approximation by Simple Poles – Part II: System Level Synthesis Beyond Finite Impulse Response. Submitted to *IEEE Transactions on Automatic Control*, 2022.

P. D. Grontas, M. W. Fisher, and F. Dörfler. Distributed and Constrained \mathcal{H}_2 Control Design via System Level Synthesis and Dual Consensus ADMM. Submitted to *IEEE Conference on Decision and Control*, 2022.

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*, 21(1): 327-365, 2022.

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

M. W. Fisher and I. A. Hiskens. Comments on “Stability Regions of Nonlinear Autonomous Dynamical Systems.” *IEEE Transactions on Automatic Control*, 66(12): 6194-6196, 2021.

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.

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

Student Supervision

- 2020-2022 **PhD Student Supervision**
- Verena Häberle (co-advised with Florian Dörfler)
Institution: ETH Zürich
Project: Decentralized control of heterogeneous power generation sources in a dynamic virtual power plant. More details available [here](#).
- 2021-2022 **Master Student Supervision**
- Panagiotis Grontas
Institution: ETH Zürich
Project: Distributed and Constrained \mathcal{H}_2 Control Design via System Level Synthesis and Dual Consensus ADMM.
- 2021-2022 **Master Thesis Supervision**
- Francisco Canales Pérez
Institution: ETH Zürich
Thesis: Heterogeneous Ensemble Control with State and Input Constraints for Dynamic Virtual Power Plants.
 - Moritz Danninger (co-advised with Johanna Vorwerk)
Institution: ETH Zürich
Thesis: Optimization-based nonlinear control of inverter-interfaced thermal loads.
- 2020-2022 **Semester Project Supervision**
- Simon Schnellmann (co-advised with Johanna Vorwerk)
Institution: ETH Zürich
Project: Assessing nonlinear stability of inverter-interfaced demand response.
 - Gianluca Mancini (co-advised with Verena Häberle and Eduardo Prieto)
Institution: ETH Zürich
Project: Control of Dynamic Virtual Power Plants with Geographically Distributed Energy Sources.
 - Panagiotis Grontas
Institution: ETH Zürich
Project: Dynamic tracking for distributed and adaptive control of dynamic virtual power plants.
 - Jules Authier (co-advised with Verena Häberle and Eduardo Prieto)
Institution: ETH Zürich
Project: Control of Dynamic Virtual Power Plants with Geographically Distributed Energy Sources.

Teaching Experience

- 2022 **Course Instructor**
- Digital Control Applications (ECE 484)
Undergraduate course at University of Waterloo
- 2021 **Guest Lecturer**
- Power System Dynamics, Control, and Operation
Graduate course at ETH Zürich
- 2018 **Guest Lecturer**
- Nonlinear Dynamics and Control
Graduate course at University of Michigan - Ann Arbor
- 2021 **Teaching Assistant**
- Power System Dynamics, Control, and Operation
Graduate course at ETH Zürich
- 2020 **Teaching Assistant**
- Control Systems 1
Undergraduate course at ETH Zürich
- 2018 **Graduate Student Instructor**
- Nonlinear Dynamics and Control
Graduate course at University of Michigan - Ann Arbor

Conference Presentations

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