Anna Stuhlmacher

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Education

University of Michigan — **Ann Arbor, MI**
Ph.D. - Electrical Engineering — *2023*
Advisor: Johanna L. Mathieu

University of Michigan — **Ann Arbor, MI**
M.S. - Electrical Engineering — *2019*

Boston University — **Boston, MA**
B.S. - Electrical Engineering — *2017*
Summa Cum Laude

Positions

Michigan Technological University — **Houghton, MI**
Assistant Professor, Electrical and Computer Engineering — *2023-Present*

University of Michigan — **Ann Arbor, MI**
Graduate Student Research Assistant — *2017-2023*
Graduate Student Instructor — *Fall 2021*
Undergraduate Researcher, Summer Research Opportunity Program — *Summer 2016*

National Renewable Energy Laboratory — **Golden, CO**
Power Systems Control and Optimization Intern — *Summer 2021*

Boston University — **Bosten, MA**
Undergraduate Research Assistant in Joshua Semeter's Lab — *2014-2017*

Publications and Presentations

** indicates presenter*

Journal Papers

[J5] **A. Stuhlmacher**, S. Guikema, and J. L. Mathieu, "Assessing Network Resilience under an Optimal Water Pumping Control Strategy to Provide Frequency Regulation", In: (Review).

[J4] C. Ten, **A. Stuhlmacher**, Y. Tang, and L. Dilworth, "Operational Planning for Emerging Distribution System: A Unique Perspective of Grid Expansion", In: (Review).

[J3] **A. Stuhlmacher*** and J. L. Mathieu, "Flexible Drinking Water Pumping to Provide Multiple Grid Services", In: Electric Power Systems Research - Special Issue for the 2022 Power Systems Computation Conference (PSCC), vol. 212, p. 108491. Porto, Portugal, June 2022. DOI: 10.1016/j.epsr.2022.108491.

[J2] **A. Stuhlmacher** and J. L. Mathieu,"Chance-Constrained Water Pumping to Manage Water and Power Demand Uncertainty in Distribution Networks," In: Proceedings of the IEEE, vol. 108, no. 9, pp. 1640-1655. 2020. DOI: 10.1109/JPROC.2020.2997520.

[J1] **A. Stuhlmacher*** and J. L. Mathieu,"Water Distribution Networks as Flexible Loads: A Chance-constrained Programming Approach", In: Electric Power Systems Research - Special Issue for the 2020 Power Systems Computation Conference (PSCC), vol. 188, p. 106570. (virtual), June 2020. DOI: 10.1016/j.epsr.2020.106570. *Presentation Link.*

Conference Proceedings

[C4] **A. Stuhlmacher***, J. L. Mathieu, and P. Seiler, "Optimizing Dual-Axis Solar Panel Operation in an Agrivoltaic System and Implications for Power Systems", In: Proceedings of the 57th Hawaii International Conference on System Sciences (HICSS). Waikiki, Hawaii, January 2024.

[C3] **A. Stuhlmacher*** and J. L. Mathieu, "Uncertainty-Aware Methods for Leveraging Water Pumping Flexibility for Power Networks", In: Proceedings of the IREP Symposium on Bulk Power System Dynamics and Control. Banff, Canada, August 2022. DOI: 10.48550/arXiv.2207.04943.

[C2] **A. Stuhlmacher***, L. A. Roald, and J. L. Mathieu, "Tractable Robust Drinking Water Pumping to Provide Power Network Voltage Support", In: Proceedings of the Conference on Decision and Control (CDC). (virtual), pp. 4206-4213, December 2021. DOI: 10.1109/CDC45484.2021.9683419.

[C1] **A. Stuhlmacher*** and J. L. Mathieu, "Chance-Constrained Water Pumping Managing Power Distribution Network Constraints", In: Proceedings of the North American Power Symposium (NAPS). Wichita, KS, October 2019. DOI: 10.1109/naps46351.2019.9000282.

Dissertation

A. Stuhlmacher, "Optimal Scheduling and Control of Uncertain Coupled Power-Water Distribution Networks". PhD Thesis. University of Michigan. May 2023. DOI: 10.7302/7426.

Abstracts with Oral Presentations

[A3] **A. Stuhlmacher***, S. Guikema, and J. L. Mathieu, "Assessing the Resilience of an Optimal Water Pumping Control Strategy to Provide Frequency Regulation", INFORMS Annual Meeting. Phoenix, AZ, October 2023.

[A2] **A. Stuhlmacher*** and J. L. Mathieu, "Stochastic Optimization of Water Distribution Network Operation to Provide Power Grid Flexibility", SIAM Conference on Optimization Annual Meeting. Seattle, WA, May 2023.

[A1] **A. Stuhlmacher***, L. A. Roald, and J. L. Mathieu, "An Adjustable Robust Optimization Model for Drinking Water Pumping as a Flexible Load", INFORMS Annual Meeting. (virtual), October 2021.

Posters

[P10] **A. Stuhlmacher*** and J. L. Mathieu, "Assessing the Resilience of an Optimal Water Pumping Strategy to Provide Frequency Regulation", IEEE Power and Energy Society General Meeting. Orlando, FL, July 2023.

[P9] **A. Stuhlmacher***, J. L. Mathieu, and P. Seiler, "Optimizing Dual-Axis Solar Panel Operation in an Agrivoltaic System under Uncertainty", AgriVoltaics2023 Conference and Exhibition, (virtual), April 2023. *Presentation Link.*

[P8] **A. Stuhlmacher*** and J. L. Mathieu, "Computationally Tractable Uncertainty-Aware Framework for Optimal Water Pumping in Coupled Power-Water Systems", Fifth Workshop on Autonomous Energy Systems, National Renewable Energy Laboratory (NREL). Golden, CO, July 2022.

[P7] D. Li*, **A. Stuhlmacher**, and J. L. Mathieu, "Estimating the Demand Response Potential of Drinking Water Distribution Networks in Arizona", University of Michigan Undergraduate Research Symposium. Ann Arbor, MI, April 2022.

[P6] C. Bertcher*, **A. Stuhlmacher**, and J. L. Mathieu, "Comparison of Linearized Three-Phase Unbalanced Power Flow Models", IEEE Power and Energy Society General Meeting. (virtual), July 2021. *Presentation Link.*

[P5] C. Bertcher*, **A. Stuhlmacher**, and J. L. Mathieu, "UM Bus Electrification: Challenges and Solutions", University of Michigan Undergraduate Research Symposium. Ann Arbor, MI, April 2019.

[P4] **A. Stuhlmacher*** and J. L. Mathieu, "Stochastic Water Distribution Network Operation Considering Power Distribution Network Constraints", Engineering Graduate Symposium, University of Michigan. Ann Arbor, MI, October 2018.

[P3] **A. Stuhlmacher***, J. L. Mathieu, and V. Gupta, "Water-Power Distribution Network Coupling for Optimal Pumping to Reduce Energy Costs and Promote Resilience", Engineering Graduate Symposium, University of Michigan. Ann Arbor, MI, November 2017.

[P2] **A. Stuhlmacher***, S. Crocker, and J. L. Mathieu, "Effects of Aggregate Load Control on the Physical Constraints of Distribution Networks", Rackham Summer Research Opportunity Program Symposium, University of Michigan. Ann Arbor, MI, July 2016.

[P1] S. Crocker*, **A. Stuhlmacher**, and J. L. Mathieu, "Effects of Aggregate Load Control on the Physical Components of Distribution Networks", IEEE PES General Meeting. Boston, MA, July 2016.

Awards and Fellowships

Rackham Predoctoral Fellowship **$44,214**
Rackham Graduate School, University of Michigan
May 2022-April 2023

Graduate Research Fellowship Program (GRFP) **$138,000**
National Science Foundation
2017-2020

Societal Impact Award **$250**
Senior Design Capstone Project

College of Engineering, Boston University
Spring 2017

Entrepreneurial Award
Senior Design Capstone Project
Department of Electrical and Computer Engineering, Boston University
Spring 2017

Talks

- Michigan Technological University, Alternative Energy Enterprise, (Upcoming), November 28th, 2023.
- IEEE Northeastern Wisconsin Section, (Upcoming), November 2nd, 2023.
- Stanford University, Water and Energy Efficiency for the Environment Lab (WE3Lab), "Optimizing Flexible Drinking Water Networks to Support Power System Performance" (virtual), July 14th, 2023.
- Cornell University, "Optimizing Flexible Drinking Water Networks to Support Power System Performance", March 13th, 2023.
- Oregon State University, "Optimizing Flexible Drinking Water Networks to Support Power System Performance", February 22nd, 2023.
- Michigan Technological University, "Optimizing Flexible Drinking Water Networks to Support Power System Performance", February 6th, 2023.
- Portland State University, "Optimizing Flexible Resources to Support Power System Resiliency", January 11th, 2023.
- Hope College, "Drinking Water Networks as Flexible Loads in the Power Grid", November 12th, 2021.

Teaching and Mentoring Experience

MTU EE 3120: Electrical Energy Systems — **Houghton, MI**
Instructor — *Fall 2023*

UM EECS 460: Control Systems Analysis and Design — **Ann Arbor, MI**
Graduate Student Instructor — *Fall 2021*

BU EC 402: Introduction to Control Systems — **Boston, MA**
Undergraduate Teaching Fellow — *Spring 2017*

Guest Lecture

- UM EECS 534: Analysis of Electric Power Distribution Grids and Loads,
  "Power Flow Relaxations and Approximations for Unbalanced Networks", Oct. 12, 2022.

Graduate Teacher Certificate — **Ann Arbor, MI**
University of Michigan, Center for Research on Learning and Teaching (CRLT) — *Spring 2022*

Graduate Research Mentor, University of Michigan — **Ann Arbor, MI**
Catherine Bertcher — *2018-2021*
Daniel Li — *2021-2022*

UM EECS 598: Markets and Optimization — **Ann Arbor, MI**
Grader — *Fall 2019, Spring 2022*

Service

Society Memberships

** intermittently*

Institute of Electrical and Electronics Engineers (IEEE)
Institute for Operations Research and the Management Sciences (INFORMS)*
Graduate Society of Women Engineers
Tau Beta Pi Engineering Honors Society
IEEE HKN Boston University Chapter
Order of the Engineer

Technical Committees

IEEE PES Task Force on Water-Power Systems

Reviewer

Journals

IEEE Transactions on Power Systems
IEEE Transactions on Control of Networked Systems
IEEE Transactions on Smart Grids
Electric Power Systems Research
IEEE Power Engineering Letters

Conferences

Power Systems Computation Conference (PSCC)
Conference on Decision and Control (CDC)
Probabilistic Methods Applied to Power Systems (PMAPS)
American Control Conference (ACC)

Internal Service

ECE Diversity and Outreach Committee, September 2023-Present

Graduate Seminar Course Planning Taskforce, September 2023-Present

Capital Project Proposals Taskforce, September 2023-Present

Outreach

BuddEEs Mentor, Ph.D. Peer Mentorship Program
Electrical and Computer Engineering, University of Michigan, 2020-2023

Graduate Mentor
Lunch and Lab with a Grad Mentoring Program, College of Engineering, University of Michigan, 2020.

Service Learning and Trans-disciplinary Education (SLATE)
University of Michigan, 2018-2019.

Graduate Student Panelist, "Preparing for Graduate School"
Summer Undergraduate Research in Engineering (SURE), University of Michigan, 2017.