

# Anna Stuhlmacher

Department of Electrical and Computer Engineering  
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## Education

<b>University of Michigan</b> <i>Ph.D. - Electrical Engineering</i> Advisor: Johanna L. Mathieu	<b>Ann Arbor, MI</b> 2023
<b>University of Michigan</b> <i>M.S. - Electrical Engineering</i>	<b>Ann Arbor, MI</b> 2019
<b>Boston University</b> <i>B.S. - Electrical Engineering</i> <i>Summa Cum Laude</i>	<b>Boston, MA</b> 2017

## Positions

<b>Michigan Technological University</b> <i>Assistant Professor, Electrical and Computer Engineering</i>	<b>Houghton, MI</b> 2023-Present
<b>University of Michigan</b> <i>Graduate Student Research Assistant</i> <i>Graduate Student Instructor</i> <i>Undergraduate Researcher, Summer Research Opportunity Program</i>	<b>Ann Arbor, MI</b> 2017-2023 Fall 2021 Summer 2016
<b>National Renewable Energy Laboratory</b> <i>Power Systems Control and Optimization Intern</i>	<b>Golden, CO</b> Summer 2021
<b>Boston University</b> <i>Undergraduate Research Assistant in Joshua Semeter's Lab</i>	<b>Boston, MA</b> 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] **A. Stuhlmacher**, C. Ten, L. Dilworth, and Y. Tang, "Operational Planning for Emerging Distribution Systems: A Unique Perspective on Grid Expansion", In: Foundations and Trends in Electric Energy Systems, vol. 7, no. 2, pp. 63-164, 2023. DOI: 10.1561/31000000033.
- [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. DOI: 10125/106735.

- [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.

## Technical Reports.....

- [T1] R. O’Neil, K. Oikonomou, M. Parvania, V. Tidwell, A. T. Al-Awami, M. Panteli, S. Conrad, T. Brekken, E. Goharian, N. Voisin, “Integrated Water and Power Systems: Current State and Research Roadmap,” IEEE PES Task Force on Water Power Systems, Technical Report No. PES-TR114, September 2023. *\*Contributor to the ‘Integrated Operation of Water and Power Systems’ Topic Area*

## 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

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<b>Rackham Predoctoral Fellowship</b> <i>Rackham Graduate School, University of Michigan</i> May 2022-April 2023	<b>\$44,214</b>
<b>Graduate Research Fellowship Program (GRFP)</b> <i>National Science Foundation</i> 2017-2020	<b>\$138,000</b>
<b>Societal Impact Award</b> <i>Senior Design Capstone Project</i> <i>College of Engineering, Boston University</i> Spring 2017	<b>\$250</b>
<b>Entrepreneurial Award</b> <i>Senior Design Capstone Project</i> <i>Department of Electrical and Computer Engineering, Boston University</i> Spring 2017	

## Talks

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- (Upcoming) IEEE Northeastern Wisconsin Section, "Agrivoltaics - Placing Solar Photovoltaic Panels Over Cropland", February 15th, 2024.
- (Upcoming) Polytechnique Montréal, Group for Research in Decision Analysis (GERAD), "Optimizing Dynamic Solar Panel Operation in an Agrivoltaic System and Implications for Power Systems" (virtual), January 24th, 2024.
- Michigan Technological University, Alternative Energy Enterprise, "Agrivoltaics - Placing Solar Photovoltaic Panels Over Cropland", November 28th, 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

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<b>MTU EE 5232: Power System Optimization</b> <i>Instructor</i>	<b>Houghton, MI</b> <i>Spring 2024</i>
<b>MTU EE 3120: Electrical Energy Systems</b> <i>Instructor</i>	<b>Houghton, MI</b> <i>Fall 2023</i>
<b>UM EECS 460: Control Systems Analysis and Design</b> <i>Graduate Student Instructor</i>	<b>Ann Arbor, MI</b> <i>Fall 2021</i>
<b>BU EC 402: Introduction to Control Systems</b> <i>Undergraduate Teaching Fellow</i>	<b>Boston, MA</b> <i>Spring 2017</i>
<b>Guest Lecture</b> <ul style="list-style-type: none"><li>• UM EECS 534: Analysis of Electric Power Distribution Grids and Loads, "Power Flow Relaxations and Approximations for Unbalanced Networks", October 12th, 2022.</li></ul>	
<b>Graduate Teacher Certificate</b> <i>University of Michigan, Center for Research on Learning and Teaching (CRLT)</i>	<b>Ann Arbor, MI</b> <i>Spring 2022</i>
<b>UM EECS 598: Markets and Optimization</b> <i>Grader</i>	<b>Ann Arbor, MI</b> <i>Fall 2019, Spring 2022</i>

## Students

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### Ph.D. Students

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- Mary Nusrat, January 2024-Present

### Undergraduate Students

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- Catherine Bertcher (University of Michigan), September 2018-May 2021
- Daniel Li (University of Michigan), November 2021-April 2022

## Service

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### Society Memberships

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\* *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

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IEEE PES Task Force on Water-Power Systems

### Conferences

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Session Co-Chair, Hawaii International Conference on System Sciences, 2025

### Reviewer

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#### 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

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Leading Scholars ECE Faculty Volunteer, Spring 2024  
SWE Scholarship Review Board, November 2023  
ECE Diversity and Outreach Committee, September 2023-Present  
Graduate Seminar Course Planning Taskforce, September 2023-Present  
Capital Project Proposals Taskforce, September 2023-Present