

ZIXIAO MA

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EDUCATION

Iowa State University

Ph.D., Electrical Engineering

Advisor: Prof. Zhaoyu Wang

Ames, IA, USA

May 2017 - May 2023

Northeastern University

M.S., Control Science and Engineering

Advisor: Prof. Tianyou Chai

Shenyang, Liaoning, China

Sep. 2014 - Jan. 2017

Northeastern University

B.S., Automation

Shenyang, Liaoning, China

Sep. 2010 - Jun. 2014

PROFESSIONAL EMPLOYMENT

University of Washington

Distinguished Postdoctoral Fellow in Clean Energy Institute

Hosted by Prof. Baosen Zhang

Seattle, WA, USA

Jun. 2023-Present

PUBLICATION

Journal Paper

- [J16] **Z. Ma**, Q. Zhang and Z. Wang, “Safe and Stable Secondary Voltage Control of Microgrids based on Explicit Neural Networks,” *IEEE Transactions on Smart Grid*, vol. 14, no. 5, pp. 3375-3387, 2023.
- [J15] **Z. Ma**, Z. Wang and Rui Cheng, “Analytical Large-Signal Modeling of Inverter-based Microgrids with Koopman Operator Theory for Autonomous Control,” *IEEE Transactions on Smart Grid*, early access, 2023.
- [J14] **Z. Ma**, Z. Wang, Y. Yuan and T. Hong, “Singular Perturbation-based Large-Signal Order Reduction of Microgrids for Stability and Accuracy Synthesis with Control,” submitted to *IEEE Transactions on Smart Grid*, 2023.
- [J13] L. Liu, N. Shi, D. Wang, **Z. Ma**, Z. Wang, M. J. Reno, and J. A. Azzolini, “Voltage Calculations in Secondary Distribution Networks via Physics-Inspired Neural Network Using Smart Meter Data,” submitted to *IEEE Transactions on Smart Grid*, 2023.
- [J12] R. Cheng, N. Shi, Z. Wang and **Z. Ma**, “Optimal Power Flow for Integrated Primary-Secondary Distribution Networks with Service Transformers,” submitted to *IEEE Transactions on Power Systems*, 2023.
- [J11] **Z. Ma**, Y. Xiang and Z. Wang, “Robust Conservation Voltage Reduction Evaluation using Soft Constrained Gradient Analysis,” *IEEE Transactions on Power Systems*, vol. 37, no. 6, pp. 4485-4496, 2022.
- [J10] **Z. Ma**, B. Cui, Z. Wang and D. Zhao, “Parameter Reduction of Composite Load Model using Active Subspace Method,” *IEEE Transactions on Power Systems*, vol. 36, no. 6, pp. 5441-5452, Nov. 2021.
- [J9] **Z. Ma**, Z. Wang, Y. Guo, Y. Yuan and H. Chen, “Nonlinear Multiple Models Adaptive Secondary Voltage Control of Microgrids,” *IEEE Transactions on Smart Grid*, vol. 12, no. 1, pp. 227-238, 2021.
- [J8] J. Fu, **Z. Ma**, Y. Fu, T. Chai, “Hybrid Adaptive Control of Nonlinear Systems with Non-Lipschitz Nonlinearities,” *Systems & Control Letters*, vol. 156, no. 105012, 2021.
- [J7] J. Xie, **Z. Ma**, K. Dehghanpour, Z. Wang, Y. Wang, R. Diao and D. Shi, “Imitation and Transfer Q-Learning-based parameter identification for composite load modeling,” *IEEE Transactions on Smart Grid*, vol. 12, no. 2, pp. 1674-1684, 2021.

- [J6] Q. Zhang, **Z. Ma**, Y. Zhu and Z. Wang, “A Two-Level Simulation-Assisted Sequential Distribution System Restoration Model With Frequency Dynamics Constraints,” *IEEE Transactions on Smart Grid*, vol. 12, no. 5, pp. 3835-3846, 2021.
- [J5] F. Bu, **Z. Ma**, Y. Yuan and Z. Wang, “WECC Composite Load Model Parameter Identification using Evolutionary Deep Reinforcement Learning,” *IEEE Transactions on Smart Grid*, vol. 11, no. 6, pp. 5407-5417, 2020.
- [J4] **Z. Ma**, Z. Wang, D. Zhao and B. Cui, “High-Fidelity Large-signal Order Reduction Approach for Composite Load Model,” *IET Generation, Transmission & Distribution*, vol. 14, no. 21, pp. 4888-4897, 2020.
- [J3] **Z. Ma**, Z. Wang, Y. Wang, R. Diao and D. Shi, “Mathematical Representation of WECC Composite Load Model,” *Journal of Modern Power Systems and Clean Energy*, vol. 8, no. 5, pp. 1015-1023, 2020.
- [J2] J. Li, **Z. Ma** and J. Fu, “Exponential Stabilization of Switched Discrete-Time Systems with All Unstable Modes,” *Asian Journal of Control*, vol. 20, no. 1, pp. 608-612, 2018.
- [J1] J. Li, J. Fu and **Z. Ma**, “Improved Event-Triggered Control for a Class of Continuous-Time Switched Linear Systems,” *IET Control Theory & Application*, vol. 12, no. 7, pp. 1000-1005, 2018.

Dissertation

Z. Ma, “Composite load modeling for power systems: Model reduction, identification, and application to conservation voltage reduction,” Ph.D. dissertation, Iowa State University, Ames, IA, 2023.

TEACHING PLAN

Areas Prepared to Teach: Power Systems, Dynamical Systems, Control Theory, Signal and Systems, Optimization, Data Analytics, Machine Learning

AWARDS

- Distinguished Postdoctoral Fellowship, University of Washington, 2023
- Chinese Government Award for Outstanding Self-financed Students Abroad, 2023
- Research Excellent Award, Iowa State University, 2023
- Outstanding Reviewer, *IEEE Transactions on Power Systems*, 2021

SERVICES

Peer Reviewer

- *Journals:* *IEEE Transactions on Power Systems*; *IEEE Transaction on Smart Grid*; *IEEE Transaction on Sustainable Energy*; *IEEE Transactions on Power Delivery*; *IEEE Transaction on Energy Conversion*; *IEEE Transactions on Circuits and Systems II: Express Briefs*; *IEEE Transactions on Systems, Man, and Cybernetics: Systems*; *Applied Energy*; *IET Generation, Transmission & Distribution*; *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, *Systems & Control Letters*
- *Conferences:* 2023 Power & Energy Society General Meeting (PESGM), 2022 Power & Energy Society General Meeting (PESGM), 2022 IEEE Innovative Smart Grid Technology Conference, 2021 Power & Energy Society General Meeting (PESGM), 2021 IEEE Innovative Smart Grid Technology Conference, 2020 Power & Energy Society General Meeting (PESGM)

Technical Committee Officers

- Section Co-Lead of Methodologies Selection of IEEE Standard P3102, IEEE Conservation Voltage Reduction (CVR) Task Force, 2020 - present

INVITED TALKS

- Creating Ground Truth for Validation of CVR Assessment, Commonwealth Edison, May 19, 2023.
- Energy Savings via Conservation Voltage Reduction: Measurement and Verification Methodologies and Field Results, University of Washington Clean Energy Institute Seminar, February 9, 2023.
- Conservation Voltage Reduction Measurement and Verification Methodologies and Field Results, Southeast University, November 26, 2022.
- WECC Modeling and Validation Subcommittee Meeting (virtual), *Python-PSSE based tool to identify composite model parameters*, November 30, 2021.
- NERC Load Modeling Working Group Meeting (virtual), *Python-PSSE based WECC composite load identification tool*, July 27, 2021.
- Webinar to American Electric Power, *WECC Composite Load Model Identification using Python-PSSE*, May 18, 2021.
- Western Electricity Coordinating Council (Salt Lake City, Utah), *Mathematical Representation and Dynamic Order Reduction of WECC Composite Load Model*, April 3, 2019.
- GEIRI North America (San Jose, CA), *Mathematical Modeling of WECC Composite Load Models*, December 4, 2018.