Peng Zhang

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EDUCATION

University of Wisconsin-Madison (UW-Madison), Madison, US — Sep 2025 - Present
PhD in Electrical and Computer Engineering

- **GPA:** 4.0/4.0, **Advisors:** Prof. Manish Singh and Prof. Line Roald
- **Research:** Inverse Optimization and Sensitivity Analysis for Informativity of Distribution Systems

University of Washington (UW), Seattle, US — Sep 2023 - Jun 2025
MS in Electrical Engineering

- **GPA:** 3.95/4.0, **Advisor:** Prof. Baosen Zhang
- **Research:** Online Optimal Voltage Control in Power Distribution Networks

North China Electric Power University (NCEPU), Beijing, China — Sep 2019 - Jun 2023
BEng in Electrical Engineering and Its Automation

- **GPA:** 93.08/100 (3.95/4.0), **Ranking in 3 years:** 1/55, 1/399, 7/396
- **Thesis:** High-Resolution Spatiotemporal Assessment of Onshore and Offshore Wind Energy and Long-Term System Planning, advised by Prof. Nian Liu

PUBLICATIONS

[1] **P. Zhang**, L. Roald and M. Singh. **A Characterization of Measurement Informativity for Voltage Monitoring in Distribution Networks**. (In progress)

[2] **P. Zhang** and B. Zhang. **Optimal Voltage Control Using Online Exponential Barrier Method**. North American Power Symposium, 2025. [Slides]

[3] **P. Zhang** and B. Zhang. **Online Voltage Regulation of Distribution Systems with Disturbance-Action Controllers**. arXiv preprint arXiv:2412.00629, (Poster) PESGM 2025. [Poster]

[4] Y. Zhang, L. Wang, **P. Zhang**, et.al. **The Nonlinear Wave Solutions and Parameters Discovery of the Lakshmanan-Porsezian-Daniel based on Deep Learning**, Chaos, Solitons & Fractals 159, 112155 (2022)

RESEARCH EXPERIENCE

Online Voltage Control for Distribution Systems under Model Inaccuracy — Jan 2024 - Aug 2025
Research Assistant; Supervisor: Prof. Baosen Zhang, UW

- **Real-time OPF** Designed iterative algorithms for both active and reactive power outputs of inverters, based on the real-time feedback from distribution networks to handle model inaccuracies, in contrast to the offline OPF problem resolved in one-shot
- **Disturbance-action controller (DAC):** Explicitly leveraged the correlation of uncontrollable loads and regarded them as system disturbances; formulated DAC for online voltage control under communication delay and time-varying load and solar information; derived the closed-form expression for the closed-loop system dynamics and provided theoretical results on stability and performance degradation under inaccurate model
- **Online exponential barrier:** Proposed a barrier-based Lagrangian method for a better trade-off between safety and optimality of voltage control under model inaccuracies, compared to the classic barrier method (double-loop) and Lagrangian (linear addition); improved intermediate voltage contraint satisfaction; provided the analytical selection rule for barrier weights and proved the safety guarantee at convergence

Spatiotemporal Modeling and Planning of Large-scale Power Systems — Sep 2022 - Jun 2023
Research Assistant, Supervisor: Prof. Nian Liu, NCEPU

- **Resources assessment:** Evaluated physical potential of PV and wind energy by processing hyper-scale and high-resolution numerical weather and geospatial data from Seniverse, NREL, NASA, etc, based on PVLIB and modified wind output model; assessed economic potential by calculating Levelized Cost of Electricity (LCOE)
- **System planning:** Formulated the large-scale linear/quadratic programming for the optimal system expansion and operation scheme within provincial grids with integration of utility-scale PV, wind, energy storage, etc.

- **Adequacy under extreme weather:** Characterized the nonlinear response of loads to the outdoor temperature; served as the team member to comprehensively evaluate the nationwide adequacy and flexibility of renewable energy during diverse extreme weather events, e.g., hot and cold waves. [Project Paper]

Interdisciplinary Research on Machine Learning and Nonlinear Dynamics May 2020 - Jun 2023
Research Assistant; Supervisor: Prof. Lei Wang, NCEPU

- **Analytical methods:** Applied Linear Stability Analysis (LSA), Darboux Transformation (DT) to explore the evolution of solutions dynamics to the governing of high-order and high-dimensional nonlinear PDEs
- **Data-driven methods:** Leveraged Physics-Informed Neural Network (PINN) to both discover the mechanism of control equations (backwards) and infer the solutions (forwards) under corresponding conditions; extended PINN to (2+1)-d in the context of DS I equation that describes the wave dynamics in shallow water; predicted the evolution of rogue waves and explored the transition conditions among three families of lump waves

INTERNSHIP

GE Vernova, Bothell, WA Jun 2024 - Aug 2024
Digital Technology Intern, Grid Sector of Electrification Software (ESW)

- Learned GE's software (*Platform and Habitat*) delivered to utilities across the US for analysis and operation of transmission systems
- Explored the best schedule for controllable reactive power devices, e.g., generators with Automatic Voltage Regulation (AVR) and shunt capacity banks, to minimize system loss by exploiting the analytical underlying relationship, compiled as new functionality in Python module ready for integrating into current EMS software
- Solved for the optimal cost-efficient actions to reach utility-specific voltage requirements, utilized chance-constrained optimization methods to improve the system robustness against large uncertainties from renewable energy resources

AWARDS & HONORS

Novotny Welcome Awards, UW-Madison Oct 2025
NAPS Student Travel Award, Hartford CT Oct 2025
IEEE PES GM Student program, Austin TX Jul 2025
Outstanding Graduated Undergrad in Beijing (4%), NCEPU Jun 2023
Extra-high Voltage (EHV) Scholarship (0.4%), NCEPU Sep 2022
First-class Schneider Electric Scholarship (1%), NCEPU Sep 2021
First-class Academic Scholarship (5%), NCEPU Sep in 2020, 2021, 2022

COMPETITION

Mathematical Contest in Modeling (MCM) Feb 2021
Team Leadrer, ***Finalist Winners (2% Worldwide)***

- Formulated a wildfire risk assessment and resource allocation framework using NASA climate data.
- Modified *ID3 decision tree* to identify risk levels across discretized geographic regions, leveraged *Time-series Analysis* (TSA) for fire occurrence forecasting and obtained an empirically optimal drone procurement strategy for rapid bushfire response in Australia.

EXTRACURRICULAR ACTIVITIES

Volunteer for Discovery Day 2025, UW May 2024

- Guided 4th–8th grade students and their parents in hands-on science exhibition activities and promoted engagement within the interdisciplinary engineering community.

SKILLS

Programming: Python, MATLAB & Mathematica (Proficient), C, Julia (Moderate)
Tools: (*Optimization*) Gurobi/Mosek/CPLEX, CVX; (*Power Systems*) MATPOWER/Pandapower/PyPSA, Multisim, PVLIB, PowerWorld, COMSOL; (*Machine Learning*) PyTorch and TensorFlow