College of Control Science and Engineering
Zhejiang University, Hangzhou

Lanting Zeng

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Education

Zhejiang University, Hangzhou, China 2020.9-

- **Ph.D. Student in Control Science and Engineering**
- **Supervisor:** Mingyang Sun

Xiamen University, Xiamen, China 2016.9-2020.6

- **B.E. in lectrical Engineering and Automation, 1/76**

Research Interest

Security of Deep Reinforcement Learning-based Energy System Operation and Control

- **Vulnerability Assessment:** explore the vulnerability of AI-based Power systems, e.g., designing physical-constrained adversarial attacks against DRL-based operation and control systems.
- **Robust Enhancement:** enhance power systems resilience and robustness under cyber-attacks or model uncertainties, e.g., solving minimax robust optimization problems with adversarial training or theoretical guarantee.

Research Experience

Physics-Constrained Vulnerability Assessment of Deep Reinforcement Learning-based SCOPF

- It proposes a physics-constrained vulnerability assessment framework for a DRL-based power system operation and control model in the SCOPF problem by considering a more realistic case that adversarial examples are stealthy (i.e., bypass the BDD mechanism) only when the manipulated observations follow the power system physical constraints.

Resilience enhancement of multi-agent reinforcement learning-based demand response

- It develops a novel robust adversarial training framework, RAMARL, which can mathematically formulate the adversarial Markov Game and improves the MARL models' performance by robust adversarial training. Specifically, RAMARL models the adversarial attacks as an optimal adversary agent considering the perturbation bound and designs periodic robust adversarial training.

Exploring the Vulnerability of Deep Reinforcement Learning-based Emergency Control System

- It comprehensively investigates adversarial attacks and defense mechanisms for DRL-based power system emergency control. It designs recovery-targeted (RT) adversarial attacks which are gradient-based approaches, and the corresponding robust defense (RD) mechanisms, which actively modify the observations based on the distances of sequential states.

Research Projects

National Natural Science Foundation of China, Co-Investigator 2022-present

- DATALESs: DATA-analytics for enhanced operation of Local Energy Systems from cyber-physical-social perspectives

National Natural Science Foundation of China, Co-Investigator 2022-present

- Physics-integrated Data-driven Methods for Resilient Transient Stability Assessment of Large-scale Power Systems

Selected Honours and Awards

- Outstanding Graduate Student Award of Zhejiang University 2023.02
- Outstanding Graduates Award of Xiamen University 2020.06
- CAI Wenzhong Scholarship Special Award of Xiamen University 2020.04
- China National Scholarship 2019.10
- Outstanding Merit Student Award of Xiamen University 2019.11
- The 13th Siemens Cup China Intelligent Manufacturing Challenge National Special Award 2019.08

Publications

- **Lanting Zeng**, Mingyang Sun, Wan Xu, Zhengyong Zhang, Ruilong Deng, and Yan Xu, "Physics-Constrained Vulnerability Assessment of Deep Reinforcement Learning-based SCOPF", *IEEE Transactions on Power Systems*, 2022.
- **Lanting Zeng**, Dawei Qiu, and Mingyang Sun, "Resilience enhancement of multi-agent reinforcement learning-based demand response against adversarial attacks", *Applied Energy*, 2022.
- Xu Wan, **Lanting Zeng**, and Mingyang Sun, "Exploring the Vulnerability of Deep Reinforcement Learning-based Emergency Control for Low Carbon Power Systems", *Proceedings of the Thirty-First International Joint Conference on Artificial Intelligence (IJCAI-22)*, 2022.