Zilin Zhuang(庄紫麟)

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Electrical and Computer Engineering, NC State University, Raleigh, North Carolina, USA
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Research Interests

- Re-envisioning the Modern Frequency Control Architecture
- Dynamics, Stability and Control of Power Electronics-Integrated Power Systems
- Power System Simulation and Computing

Education

North Carolina State University

- *PhD, FREEDM Systems Center, ECE, advised by Prof. Hantao Cui* — Raleigh, USA, 2025.8 - Now

Southeast University

- *MEng, School of Electrical Engineering, advised by Prof. Xiaobo Dou* — Nanjing, China, 2022.8 - 2025.6
  Exempt from Admission Exam

Hefei University of Technology

- *BEng, School of Electrical Engineering and Automation* — Hefei, China, 2018.8 - 2022.6
  GPA:3.64(overall)/Score:87.37(overall), 88.12(major), Rank:22/271

Experience

NARI TECHNOLOGY Co., Ltd

- *Off-campus professional practice* — Nanjing, China, 2023.9 - 2024.7

Publications

1. **Primary Frequency Control Strategy of Distribution-Level Virtual Power Plant Based on Robust Model Predictive Control**[PDF]
   Zilin Zhuang, Xiaobo Dou, Quan Ding, Ruipeng Dai, Xiaolong Xiao
   Automation of Electric Power Systems
   We provide an effective solution for distribution networks to participate in frequency regulation ancillary services.
2. **Secondary Frequency Control Strategy of Distribution-Level Virtual Power Plant**[PDF]
   Zilin Zhuang, Xiaobo Dou, Liting Yu

AEEES 2025

We provide a stochastic MPC–based secondary frequency regulation method that aggregates DERs to track AGC accurately under PV uncertainty, mitigate voltage deviations, and enable robust ancillary-service participation.

Patents

1. **Automatic intelligent hand washing system**
   CN Patent(Publication: CN214474682U, 2021.10.22)
2. **A Two-Level Day-Ahead Optimal Scheduling Method for Distribution Networks Considering Phase-Shifting Transformers**
   CN Patent(Acquired Notification of Patent Application Acceptance and Wait for Substantive Examination, Application Number: 202411069749.1)
3. **A Control Method for Multiple Microgrids Jointly Participating in Secondary Frequency Regulation of Distribution Networks**
   CN Patent(under review)

Ongoing Projects

1. **Distribution-level virtual power plant**
   advised by Prof. Dou Xiaobo
   We hope to fully utilize the regulation potential of heterogeneous resources on the distribution side to provide ancillary services with better performance.
2. **Research on key technologies for observability of multi-source distribution network operation characteristics**
   advised by Prof. Dou Xiaobo
   We hope to establish a quantitative regional voltage safety margin index and design a distributed control architecture based on a distributed regional aggregation dynamic model, and establish an inertia-based anti-disturbance observability index system.

Past Projects

1. **Secondary Frequency Control Strategy for Distribution-level Virtual Power Plant**
   Ruipeng Dai, **Zilin Zhuang**, Dou Xiaobo
   A stochastic model predictive control strategy is proposed to enhance the secondary frequency control performance of a photovoltaic-storage-charging-based distribution network.
2. **Voltage control of medium and low voltage distribution networks after large-scale access of distributed photovoltaics**

The multi-level voltage dynamic optimization control in the distribution network area breaks the regulation limitations of a single level, region, and equipment, and improves the dynamic voltage response capability and voltage problem management efficiency of distributed PVs.

Awards, Grants & Honours

Academic Performance Scholarship 2022-2024
Outstanding Undergraduate Thesis of the College 2022
Merit Student 2019-2021
Academic Performance Scholarship 2019-2021

Miscellanea

- **Professional skills:** Control system design, Power System Dynamic Modeling and Simulation
- **Programming skills:** C/C++, MATLAB, python
- **Simulation skills:** Simulink, PSCAD, PowerWorld, ANDES, EMTP
- **Hobbies:** Basketball, Table tennis, GO, Writing, Guitar Playing
- **Reviewing:** IEEE Transactions on Power Systems, PESGM 2026, Journal of Modern Power Systems and Clean Energy
- **Teaching:** Assisted in teaching Advanced Mathematics, College Physics, and Automatic Control Theory in 2019-2020, Signals and Systems in 2023.