BO ZHOU

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EMPLOYMENT

University of Michigan, Ann Arbor, United States *September 2022 - Present*
Research Fellow, Department of Industrial and Operations Engineering
Mentor: Prof. Siqian Shen

EDUCATION

Huazhong University of Science and Technology, Wuhan, China *September 2017 - June 2022*
Ph.D. in Electrical Engineering
Supervisor: Prof. Jinyu Wen
Thesis: "Power System Flexible Operation by Using Continuous-Time Optimization Theory"

Huazhong University of Science and Technology, Wuhan, China *September 2013 - June 2017*
B.S. in Electrical Engineering and Automation

RESEARCH AREAS

Theories: Uncertainty analysis, robust optimization, continuous-time optimization

Applications: Flexibility & resilience, power/energy system, energy storage, energy bank

HONORS AND AWARDS

Awards recieved as a PhD student (2017-2022):

- Outstanding Graduate, Huazhong University of Science and Technology, 2022
- National Scholarship for Postgraduate, Ministry of Education, China, 2020
- Excellent Oral Presentation, China Electrotechnical Society, 2020
- Excellent Paper Award, iSPEC 2019, IEEE Power & Energy Society, 2019

PUBLICATIONS

Papers under Review/Revision

[R3] **Bo Zhou**, Ruiwei Jiang, Siqian Shen, "Frequency-Secured Unit Commitment: Tight Approximation using Bernstein Polynomials," *IEEE Transactions on Power Systems*, submitted.

[R2] **Bo Zhou**, Ruiwei Jiang, Siqian Shen, "Differential-Algebraic Equation-Constrained Frequency-Secured Stochastic Unit Commitment," *IEEE Power & Energy Society General Meeting 2023*, submitted.

[R1] **Bo Zhou**, Xiaomeng Ai, Jiakun Fang, Kun Li, Wei Yao, Zhe Chen, Jinyu Wen, "Function-space optimization to coordinate multi-energy storage across the integrated electricity and natural gas system," *International Journal of Electrical Power & Energy System*, submitted.

Refereed Journal Papers

[J13] **Bo Zhou**, Jiakun Fang, Xiaomeng Ai, Yipu Zhang, Wei Yao, Zhe Chen, Jinyu Wen, "Partial-dimensional correlation-aided convex-hull uncertainty set for robust unit commitment," *IEEE Transactions on Power Systems*, early access. [Link]

[J12] **Bo Zhou**, Xiaomeng Ai, Jiakun Fang, Shichang Cui, Wei Yao, Zhe Chen, Jinyu Wen, "Storage right-based hybrid discrete-time and continuous-time flexibility trading between energy storage station and renewable power plants," *IEEE Transactions on Sustainable Energy*, 14(01), 465-481, 2023. [Link]

[J11] Jinyu Wen, **Bo Zhou**, Lishen Wei, "Preliminary study on an energy storage grid for future power system in China," *Power System Protection and Control (in Chinese)*, 50(07), 1-10, 2022. [Link]

[J10] Menglin Zhang, Qiuwei Wu, Jinyu Wen, **Bo Zhou**, Qingyue Guan, Jin Tan, Zhongwei Lin, Fang Fang, "Day-ahead stochastic scheduling of integrated electricity and heat system considering reserve provision by large-scale heat pumps," *Applied Energy*, 307, 118143, 2022. [Link]

[J9] **Bo Zhou**, Jiakun Fang, Xiaomeng Ai, Wei Yao, Zhe Chen, Jinyu Wen, "Flexibility-enhanced continuous-time scheduling of power system under wind uncertainties," *IEEE Transactions on Sustainable Energy*, 12(04), 2306-2320, 2021. [Link]

[J8] **Bo Zhou**, Jiakun Fang, Xiaomeng Ai, Chengxiang Yang, Wei Yao, Jinyu Wen, "Dynamic Var reserve-constrained coordinated scheduling of LCC-HVDC receiving-end system considering contingencies and wind uncertainties," *IEEE Transactions on Sustainable Energy*, 12(01), 469-481, 2021. [Link]

[J7] **Bo Zhou**, Xiaomeng Ai, Jiakun Fang, Wei Yao, Jinyu Wen, "Continuous-time modeling based robust unit commitment considering beyond-the-resolution wind power uncertainty," *Transactions of China Electrotechnical Society (in Chinese)*, 36(07), 1456-1467, 2021. [Link]

[J6] Kun Li, Xiaomeng Ai, Jiakun Fang, **Bo Zhou**, Lingling Le, Jinyu Wen, "Coordination of macro base stations for 5G network with user clustering," *Sensors*, 21(16), 5501, 2021. [Link]

[J5] **Bo Zhou**, Jiakun Fang, Xiaomeng Ai, Menglin Zhang, Wei Yao, Zhe Chen, Jinyu Wen, "Linear network model for integrated power and gas distribution systems with bidirectional energy conversion," *IET Renewable Power Generation*, 14(17), 3284-3291, 2020. [Link]

[J4] **Bo Zhou**, Jiakun Fang, Xiaomeng Ai, Wei Yao, Zhe Chen, Jinyu Wen, "Pyramidal approximation for power flow and optimal power flow," *IET Generation, Transmission & Distribution*, 14(18), 3774-3782, 2020. [Link]

[J3] Menglin Zhang, Jiakun Fang, Xiaomeng Ai, **Bo Zhou**, Wei Yao, Qiuwei Wu, Jinyu Wen, "Partition-combine uncertainty set for robust unit commitment," *IEEE Transactions on Power Systems*, 35(04), 3266-3269, 2020. [Link]

[J2] **Bo Zhou**, Xiaomeng Ai, Jiakun Fang, Wei Yao, Wenping Zuo, Zhe Chen, Jinyu Wen, "Data-adaptive robust unit commitment in the hybrid AC-DC power system," *Applied Energy*, 254, 113784, 2019. [Link]

[J1] **Bo Zhou**, Minggang Song, Jiawei Huang, Xiaomeng Ai, Wei Yao, Jinyu Wen, "Configuration optimization method of multifunctional hybrid energy storage for regional power line fault," *Automation of Electric Power System (in Chinese)*, 43(08), 25-34, 2019. [Link]

Refereed Conference Proceedings

[C3] **Bo Zhou**, Xiaomeng Ai, Jiakun Fang, Wei Yao, Jinyu Wen, "Continuous-trajectory robust unit commitment considering beyond-the-resolution uncertainty," in *Proceedings of 2020 IEEE Power & Energy Society General Meeting (PESGM 2020)*, Montreal, Canada, August 2020. [Link]

[C2] **Bo Zhou**, Xiaomeng Ai, Jiakun Fang, Chengxiang Yang, Ruitong Liu, Yingxuan Yang, Fangwei Duan, "Steady state security region considering post contingency cascaded DC commutation failure," in *Proceedings of 2019 IEEE Sustainable Power and Energy Conference (iSPEC 2019)*, Beijing, China, November 2019 (Excellent Paper). [Link]

[C1] **Bo Zhou**, Xiaomeng Ai, Jiakun Fang, Jinyu Wen, Jianhua Yang, "Mixed-integer second-order cone programming taking appropriate approximation for the unit commitment in hybrid ACDC grid," in *Proceedings of the 6th International Conference on Renewable Power Generation (IET RPG 2017)*, Wuhan, China, October 2017. [Link]

RESEARCH EXPERIENCE

Adaptive Extreme Scenario Method for Unit Commitment with Wind Power Ramp Event
Funded by National Natural Science Foundation of China *January 2018 - December 2020*
Main Works: Data-driven uncertainty set construction, flexibility research based on continuous-time optimization, beyond-the-resolution robust scheduling method, storage right-based flexibility trading between energy storage and renewables

Robust Coordinated Planning of Energy Storage in Integrated Electricity and Natural Gas System
Funded by National Natural Science Foundation of China *January 2018 - December 2020*
Main Works: Pyramidal approximation for linear power flow model, continuous spatial-temporal model of IEGS

Configuration Optimization and Control Strategy of Energy Storage Stations for the Power System
Funded by State Grid Corporation of China *January 2018 - December 2019*
Main Works: Configuration optimization of energy storage to relieve line congestion

Key Technologies in Characteristic Analysis and Security Defense for HVDC Receiving-End Power Grid
Funded by State Grid Henan Electric Power Company *August 2016 - December 2017*
Main Works: Analysis of cascaded failure and identification of critical lines in HVDC receiving-end power grid

Key Technologies of Distributed Renewable Energy Power Generation Clustering and Consumption
Funded by National Key Research and Development Program of China *July 2016 - June 2019*
Main Works: Project management and acceptance check

PRESENTATIONS

Conference Presentations

[P4] "Continuous-time modeling based robust unit commitment considering beyond-the-resolution wind power uncertainty," the 9th Frontier Academic Forum of Electrical Engineering, Xi'an, China, August, 2020 (Excellent Oral Presentation).

[P3] "Continuous-trajectory robust unit commitment considering beyond-the-resolution uncertainty," 2020 IEEE Power & Energy Society General Meeting, Montreal, Canada, August 2020.

[P2] "Steady state security region considering post contingency cascaded DC commutation failure," 2019 IEEE Sustainable Power and Energy Conference, Beijing, China, November 2019.

[P1] "Mixed-integer second-order cone programming taking appropriate approximation for the unit commitment in hybrid ACDC grid," the 6th International Conference on Renewable Power Generation, Wuhan, China, October 2017.

MEMBERSHIP AND SERVICES

Professional Membership

- Institute of Electrical and Electronics Engineers (IEEE), Member, 2019 - present
- Institute for Operations Research and the Management Sciences (INFORMS), Member, 2022 - present

Reviewer Experience

- Reviewer: IEEE Transactions on Smart Grid, IEEE Transactions on Power System, Applied Energy, IET Generation, Transmission & Distribution, IEEE Power & Energy Society General Meeting 2020

EXPERTISE

Language Skills: Written/oral English and native Chinese

Research Tools: 1) Proficient in Matlab programming
2) Good at mathematical modelling and optimization: MATPOWER, CPLEX/Gurobi, and Yalmip
3) Other applications: Microsoft office set, LaTex, OriginLab