QI WANG

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RESEARCH INTERESTS

- Distributed optimization algorithms for large-scale nonconvex/convex and MIP problems, such as ACOPF and SCUC in electrical power systems
- Methods fusing machine learning and optimization
- Uncertainty modeling and data-driven optimization algorithms

EDUCATION

Hong Kong Polytechnic University — **Hong Kong, China**
PostDoc at Department of Applied Mathematics — *2024.07 – now*
- Supervisor: Prof. Defeng Sun (***Fellow SIAM***)

Tsinghua University — **Beijing, China**
Ph.D. candidate in Electrical Engineering, Department of Electrical Engineering — *2019.08 – 2024.06*
- Supervisor: Prof. Wenchuan Wu (***Fellow IEEE***)

Nanyang Technological University — **Singapore**
Visiting Scholar in Electrical Engineering, School of Electrical and Electronic Engineering — *2023.07 – 2023.08*
- Supervisor: Prof. Zhaoyang Dong (***Fellow IEEE***)

Harbin Institute of Technology — **Harbin, China**
B.S. in Electrical Engineering, School of Electrical Engineering and Automation — *2015.08 – 2019.06*
- **GPA: 3.98/4.0 (Rank 1/223)**
- Winner of Outstanding Graduate and Outstanding Thesis

PUBLICATIONS

- **Journals**
  - J1. **Q. Wang**, W. Wu, et al., "Asynchronous Decomposition Method for the Coordinated Operation of Virtual Power Plants," ***IEEE Transactions on Power Systems***, vol. 38, no. 1, pp. 767-782, Jan. 2023. (**SCI**, **Q1**, **Cited 14 times**)
  - J2. **Q. Wang**, C. Lin, W. Wu, et al., "A Nested Decomposition Method for the AC Optimal Power Flow of Hierarchical Electrical Power Grids," ***IEEE Transactions on Power Systems***, vol. 38, no. 3, pp. 2594-2609, May 2023. (**SCI**, **Q1**, **Cited 5 times**)
  - J3. **Q. Wang**, W. Wu, et al., "A Spatio-temporal Decomposition Method for the Coordinated Economic Dispatch of Integrated Transmission and Distribution Grids," ***IEEE Transactions on Power Systems***, vol. 39, no. 3, pp. 4835-4851, May 2024. (**SCI**, **Q1**)
  - J4. **Q. Wang**, W. Wu, et al., "An Exact Relaxation Method for Complementarity Constraints of Energy Storages in Power Grid Optimization Problems," ***Applied Energy***, vol. 371, pp. 123592, Oct. 2024. (**SCI**, **Q1**)
  - J5. X. Yang, H. Liu, W. Wu, **Q. Wang**, et al., "Reinforcement Learning with Safety Guarantees for Optimal Dispatch of Distributed Energy Resources in Active Distribution Networks," ***Journal of Modern Power Systems and Clean Energy***, doi: 10.35833/MPCE.2023.000893. (**SCI**, **Q2**)
  - J6. L. SHAN, K. YAMANE, T. ONO, T. KAWAMURA, W. WU, Z. HU, **Q. Wang**, et al., "Distributed Energy Resource Management System with Improved Convergence," ***Applied Energy***, vol. 371, pp. 123566, Oct. 2024. (**SCI**, **Q1**)

J7. S, Li, **Q. Wang***, et al., "Coordinated Scheduling of Distribution Networks and Microgrids Considering Heat Pump Loads and Distributed Photovoltaics," Electric Power, 2022, 55(09): 29-37. (*In Chinese*, **Cited 9 times**)

- **Conferences**

C1. **Q. Wang**, W. Wu, et al., "Asynchronous Distributed Optimal Load Scheduling Algorithm," 2020 IEEE Power & Energy Society General Meeting (PESGM), 2020, pp. 1-5. (**Cited 2 times**)

C2. **Q. Wang**, W. Wu, et al., "Transmission and Distribution Networks Coordinated Volt/Var Control Method and Its Application in Jibei Grid," 2020 IEEE 4th Conference on Energy Internet and Energy System Integration (EI2), 2020, pp. 1331-1336. (**Cited 1 time**)

C3. **Q. Wang**, B. Li, et al., "Coordinated Scheduling of Distribution Network and Virtual Power Plants Considering Controllable Thermal Loads and Distributed Photovoltaics," 2022 IEEE 6th Conference on Energy Internet and Energy System Integration (EI2), 2022, pp. 415-419.

C4. Z. Ruan, C. Lin, **Q. Wang**, et al., "Risk-Minimizing Real-Time Dispatch for Power Systems with High Proportion Variable Renewable Generators Based on Conditional GMM," IEEE 7th International Electrical and Energy Conference (CIEEC), Harbin, China, 2024.

C5. L. SHAN, K. YAMANE, T. ONO, T. KAWAMURA, W. Wu, Z. Hu, **Q. Wang**, et al., "Distributed Energy Resource Management System with Distribution Grid Stabilization," 2022 IEEE Power & Energy Society General Meeting (PESGM), 2022. (**Cited 1 time**)

- **Patents (First Student Inventor)**

P1. W. Wu, **Q. Wang**, D. Zhang, C. Lin, S. Sun, H. Tang, P. Yu. A coordinated dispatch algorithm for integrated transmission and distribution grids, Chinese Patent, 2023115392940.

P2. B. Li, B. Wang, Y. Sun, W. Wu, **Q. Wang**, X. Fu, L. Guo, H. Sun, D. Li, C. Liu, J. Zhang. A coordinated robust scheduling method for multi-level grid considering flexible resources, Chinese Patent, 202211161694.8.

P3. B. Wang, G. Wang, W. Wu, J. Zhang, H. Sun, H. Liu, **Q. Wang**, Y. Xi, J. Xing, Z. Liu, H. Zhang, J. Zhang. Quantitative assessment method for dispatch risks considering source-load fluctuations and redispatch measures, Chinese Patent, 202211234001.3.

P4. B. Wang, Y. Du, W. Wu, H. Liu, H. Sun, G. Wang, Q. Guo, **Q. Wang**, C. Lin. A reactive power and voltage control method for integrated transmission and distribution networks based on asynchronous ADMM, Chinese Patent, CN111817309A.

P5. B. Wang, Y. Du, W. Wu, H. Liu, H. Sun, G. Wang, Q. Guo, **Q. Wang**, Z. Liu. An online voltage control method for collaborating multi-type reactive power resources, Chinese Patent, CN113346539B.

P6. B. Wang, G. Wang, W. Wu, J. Zhang, H. Sun, H. Liu, **Q. Wang**, Y. Xi, J. Xing, Z. Liu, H. Zhang, J. Zhang. Method for quantifying and assessing scheduling risk, American Patent, US18300497.

P7. B. Wang, Y. Du, W. Wu, H. Liu, H. Sun, G. Wang, Q. Guo, **Q. Wang**, C. Lin. Reactive power and voltage control method, American Patent, US17347036.

P8. B. Wang, Y. Du, W. Wu, H. Liu, H. Sun, G. Wang, Q. Guo, **Q. Wang**, Z. Liu. Online voltage control method for coordinating multi-type reactive power resources, American Patent, US17748535.

RESEARCH PROJECTS (Partial)

National Key R&D Program *2020.10 – 2022.12*

Leading Student Researcher *Ministry of Industry and Information Technology of PRC*

Project Title: Research on Generation-Transmission-Distribution-Load Robust Control Technology Considering Uncertainties

- Proposed a day-ahead chance-constrained probabilistic scheduling method and look-ahead stochastic robust rolling scheduling method for generation-transmission-distribution-load coordination.
- Proposed a joint active and reactive power coordinated control method for integrated transmission and distribution networks with super-linear convergence.
- **Developed the core module** of the stochastic robust scheduling system for generation-transmission-distribution-load coordination, based on the proposed multi-parameter projection decomposition algorithm.
- This achievement was awarded the **Third Prize for Technological Progress in Chinese Electric Power Technology**, and the First Prize for Technological Progress by State Grid Jibei Electric Power Company.

Science and Technology Project of State Grid Corporation *2020.12 – 2022.12*
Leading Student Researcher *State Grid Corporation of China*

Project Title: Risk-Controllable Power Generation Plan Collaborative Optimization Technology for Integrated Transmission and Distribution Networks

- Utilized the probability and statistical information to model the uncertainty of renewable energy and load. Based on the proposed stochastic optimization method, the optimal scheduling could be carried out under the premise of controllable operation risk.
- Proposed a probabilistic scheduling algorithm for the coordination of integrated transmission and distribution networks to realize the optimal allocation of flexible resources and improve the economy and security of the power systems.
- **Developed the probabilistic scheduling algorithm** for the coordination of integrated transmission and distribution networks.

Science and Technology Project of State Grid Corporation *2021.01 – 2022.12*
Leading Student Researcher *State Grid Corporation of China*

Project Title: Research on Integrated Security-Constrained Scheduling Technology for Coordinated Generation of New Energy and Electric-Thermal Loads

- Proposed a coordinated scheduling method for the interaction between new energy and electric-thermal loads.
- Developed a control system for new energy generation companies and electric-thermal users.

Science and Technology Project of State Grid Corporation *2021.01 – 2022.12*
Leading Student Researcher *State Grid Corporation of China*

Project Title: Research on Coordinated Volt/VAR Optimization Technology Considering Operational Uncertainty in Transmission and Distribution Networks

- Established a robust Volt/VAR optimization model considering source-load uncertainty.
- Proposed a look-ahead dispatch method for distribution networks considering the discrete reactive power resource.

AWARDS (Partial)

Postdoc Matching Fund Scheme	**Hong Kong Polytechnic University**	2024
Winners of IEEE Region 10 SAC Student Research Paper contest	**IEEE Region 10**	2024
Finalist Nomination (Top 1%)	**Ph.D. Dissertation Challenge of IEEE I&CPS Asia**	2023
Outstanding Oral Presentation Award	**Tsinghua-IET Electrical Engineering Academic Forum**	2022
Excellent Comprehensive Scholarship	**Tsinghua University**	2022
Outstanding Student Cadre (Top 1%)	**Tsinghua University**	2021
Excellent Social Practice Scholarship	Tsinghua University	2021
Silver Award for Student Social Practice Detachment (Detachment leader, Ranked **Top 2**)	Tsinghua University	2021
Outstanding Graduate	Harbin Institute of Technology	2019
Outstanding Thesis (Top 3%)	**Harbin Institute of Technology**	2019
'Three Good' Student (Top 0.5%)	**Education Department of Heilongjiang Province**	2018
Ultra-high voltage Scholarship (Top 1%)	**State Grid Corporation of China**	2016

ACADEMIC PRESENTATIONS

- **Academic Exchange at Nanyang Technological University** *2023*
  A Nested Decomposition Method for the AC Optimal Power Flow of Hierarchical Electrical Power Grids
- **Ph.D. Dissertation Challenge of IEEE I&CPS Asia 2023** *2023*

Hierarchical power grids coordinated dispatch: decomposition methods for non-convex, spatio-temporal coupling problems with imperfect communication

- **Tsinghua-IET Electrical Engineering Academic Forum** *2023*
  A Spatio-temporal Decomposition Method for the Coordinated Economic Dispatch of Integrated Transmission and Distribution Grids
- **Tsinghua-IET Electrical Engineering Academic Forum** *2022*
  Asynchronous Decomposition Method for the Coordinated Operation of Virtual Power Plants
- **IEEE PES General Meeting** *2020*
  Asynchronous Distributed Optimal Load Scheduling Algorithm

ACADEMIC POSTERS

- **IEEE 6th Conference on Energy Internet and Energy System Integration (EI2)** *2022*
  Coordinated Scheduling of Distribution Network and Microgrids Considering Controllable Thermal Loads and Distributed photovoltaics
- **IEEE 4th Conference on Energy Internet and Energy System Integration (EI2)** *2020*
  Transmission and Distribution Networks Coordinated Volt/Var Control Method and Its Application in Jibei Grid

ACADEMIC SERVICES

- **Professional Membership:** IEEE/IET Student Member, IEEE PES Member, CIGRE Student Member
- **Journal Reviewer:** IEEE Transactions on Smart Grid; IEEE Transactions on Power Systems
- **Conference Reviewer:** IEEE Power and Energy Society General Meeting (PESGM), IEEE International Electrical and Energy Conference (CIEEC), IEEE Conference on Energy Internet and Energy System Integration (EI2)

STUDENT ACTIVITIES

Counselor of the Career Development Center, Tsinghua university *2021.08-2022.06*

- Took the job fair as the work center, and carried out industry development lectures, alumni sharing salons, company visits, excellent alumni publicity and other activities to provide services for students.
- Served more than **400 job fairs**, carried out more than **60 activities** of various types, and released 7 publicities at the school level and above. The number of students that the aforementioned activities covered reached **35,000**.

Counselor of the Graduate Union of Tsinghua University *2021.01-2021.06*

- Coordinated the ‘Mentors and Friends’ special event, which was one of the important events of **Tsinghua University 110th Anniversary Ceremony**.