

Hongxun Hui

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EDUCATION

Virginia Tech

Arlington, USA

Visiting Scholar, Advanced Research Institute.

10/2018 – 10/2019

- Academic adviser: Prof. Saifur Rahman (Joseph R. Loring Professor of Electrical and Computer Engineering, and Director of Advanced Research Institute, National Capital Region)
- Expertise: Demand Response, Electricity Market.

The University of Tennessee

Knoxville, USA

Short-term Exchange, CURENT Engineering Research Center

06/2019 – 07/2019

- Academic adviser: Prof. Fangxing Li (James W. McConnell Professor in the Department of Electrical Engineering and Computer Science)
- Expertise: Demand Response.

Zhejiang University

Hangzhou, China

Ph.D., College of Electrical Engineering. GPA: 3.94/4.0

09/2015 – 06/2020

- Academic adviser: Prof. Yi Ding (Elected in the *National Thousand Young Talents Program*) & Prof. Yonghua Song (*Fellowship of the Royal Academy of Engineering*)
- Expertise: Modern Control Theory, Operation Analysis of Power System, Power Market, Demand Response.
- Award: The First Batch of the Academic Rising Star Program in Zhejiang University, Tang Lixin Scholarship

Zhejiang University

Hangzhou, China

B.S., College of Electrical Engineering. GPA: 3.92/4.0 (top 3%)

09/2011 – 06/2015

- Expertise: Advanced Mathematics, Probability Theory, Control Theory, Electrical Machinery, Programming in C.
- Award: Outstanding Graduates of Zhejiang University, Meritorious Winner in ICM

Duke Kunshan University

Kunshan, China

Academic Program

08/2014 – 12/2014

- Courses in English by Professors from Duke University, including the core course on Academic Writing.

RESEARCH INTERESTS

- **Demand response:** modeling and control of flexible loads, capacity evaluation, operating reserve, frequency regulation, peak-shaving services, access abilities of renewable energies.
- **Electricity market:** business model and market framework of demand response, electricity price policy, incentive mechanism, transaction method, settlement method, economy evaluation.
- **Uncertainty analysis:** reliability model and multiple uncertainties of flexible loads, reliability evaluation method, multi-time scale dispatch model of wind power and flexible resources.

SELECTED PUBLICATIONS

Books

1. Yi Ding, Yonghua Song, **Hongxun Hui** and Changzheng Shao. *Integration of Air Conditioning and Heating into Modern Power Systems*. Springer; 2019. (All eight chapters)

Published Journal Papers

1. **Hongxun Hui**, Yi Ding, Zhenzhi Lin, Pierluigi Siano and Yonghua Song, "Capacity Allocation and Optimal Control of Inverter Air Conditioners Considering Area Control Error in Multi-area Power Systems," *IEEE Transactions on Power Systems*, Jun. 2019.
2. **Hongxun Hui**, Yi Ding, Yonghua Song and Saifur Rahman, "Modeling and Control of Flexible Loads for Frequency Regulation Services Considering Compensation of Communication Latency and Detection Error," *Applied Energy*, vol. 250, pp. 161-74, Sep. 2019.
3. **Hongxun Hui**, Yi Ding and Menglian Zheng, "Equivalent Modeling of Inverter Air Conditioners for Providing Frequency Regulation Service", *IEEE Transactions on Industrial Electronics*, vol. 66, no. 2, pp. 1413-23, Feb. 2019.
4. **Hongxun Hui**, Yi Ding, Weidong Liu, You Lin and Yonghua Song, "Operating Reserve Evaluation of Aggregated Air Conditioners", *Applied Energy*, vol. 196, pp. 218-228, Jun. 2017.
5. Dunjian Xie, **Hongxun Hui**, Yi Ding and Zhenzhi Lin, "Operating Reserve Capacity Evaluation of Aggregated

Heterogeneous TCLs with Price Signals,” *Applied Energy*, vol. 216, pp. 338-47, Apr. 2018.

6. Wenqi Cui, Yi Ding, **Hongxun Hui**, Zhenzhi Lin, Pengwei Du, Yonghua Song and Changzheng Shao, “Evaluation and Sequential Dispatch of Operating Reserve Provided by Air Conditioners Considering Lead-Lag Rebound Effect,” *IEEE Transactions on Power Systems*, vol. 33, no. 6, pp. 6935-50, Nov. 2018.
7. Yi Ding, Wenqi Cui, Shujun Zhang, **Hongxun Hui**, Yiwei Qiu and Yonghua Song, “Multi-state Operating Reserve Model of Aggregate Thermostatically-Controlled-Loads for Power System Short-term Reliability Evaluation,” *Applied Energy*, vol. 241, pp. 46-58, May 2019.
8. Yi Ding, **Hongxun Hui** (Corresponding Author), Zhenzhi Lin, Menglian Zheng, Xinyao Qu and Wenqi Cui, “Design of Business Model and Market Framework Oriented to Active Demand Response of Power Demand Side,” *Automation of Electric Power Systems*, vol. 41, no. 14, Jul. 2017. (in Chinese)
9. Kang Xie, Kaijie Zhang, Kaining Luan, **Hongxun Hui**, Yishuang Hu and Yi Ding, “Exploration of Demand Response Score Scheme Under the Background of Electric Power System Reform,” *Power Demand Side Management*, vol. 21, no. 3, May 2019. (in Chinese)
10. Zuofeng Li, Wenqi Cui, Zhenyu Chen, **Hongxun Hui**, Kaining Luan, Bin Yang and Yi Ding, “Research and Practice of Interruptible Load in the Market Environment (I),” *Power Demand Side Management*, vol. 18, no. 6, Nov. 2016. (in Chinese)
11. Zhenyu Chen, Wenqi Cui, **Hongxun Hui**, Bin Yang, Kaining Luan and Yi Ding, “Research and Practice of Interruptible Load in the Market Environment (II),” *Power Demand Side Management*, vol. 19, no. 1, Jan. 2017. (in Chinese)
12. Yi Ding, Huahua Wu, **Hongxun Hui**, and Jun Zhang, “Analysis and Related Suggestions on Power Market Mechanism of Demand Side Response in China,” *Southern Power System Technology*, vol. 10, no. 3, pp. 24-31, Mar. 2016. (in Chinese)

• Conference Papers

1. **Hongxun Hui**, Yi Ding, Yonghua Song and Saifur Rahman, “Modelling and Dynamic Performance Analysis of the Power System Under Unit Contingency Shutdown Accidents Considering Demand Response,” *International Conference on Applied Energy*, Sweden, Aug. 2019.
2. **Hongxun Hui**, Yi Ding, Shihai Yang, “Modeling and Analysis of Inverter Air Conditioners for Primary Frequency Control Considering Signal Delays and Detection Errors,” *Energy Procedia*, vol. 158, pp. 4003-10, Hong Kong, China, 2019.
3. **Hongxun Hui**, Yi Ding, Kaining Luan and Daoqiang Xu, “Analysis of 815 Blackout in Taiwan and the Improvement Method of Contingency Reserve Capacity Through Direct Load Control”, *IEEE PES General Meeting*, Portland, U.S.A., 2018.
4. **Hongxun Hui**, Xing Jiang, Yi Ding, Yonghua Song and Li Guo, “Demonstration of Friendly Interactive Grid Under the Background of Electricity Market Reform in China”, *In Environment and Electrical Engineering and 2017 IEEE Industrial and Commercial Power Systems Europe (EEEIC/I&CPS Europe)*, pp. 1-5. IEEE, Milan, Italy, 2017.
5. **Hongxun Hui**, Weidong Liu and Yi Ding, “Quantitative Analysis of Air Conditioner Aggregation for Providing Operating Reserve”, *Energy Procedia*, vol. 104, pp. 50-55, Jinan, China, 2016.
6. Sheng Wang, **Hongxun Hui**, Yi Ding and Chengzhi Zhu, “Cooperation of Demand Response and Traditional Power Generations for Providing Spinning Reserve”, *Energy Procedia*, vol. 421, pp. 2035-41, Cardiff, UK, 2017.
7. Xinyao Qu, **Hongxun Hui**, Shengchun Yang, Yaping Li and Yi Ding, “Price Elasticity Matrix of Demand in Power System Considering Demand Response Programs”, *International Conference on Energy Engineering and Environmental Protection*, Sanya, China, 2017.
8. Xinyao Qu, **Hongxun Hui**, Yi Ding and Kaining Luan, “Optimal Control of Intelligent Electricity Consumption for Residential Customers Considering Demand Response”, *Applied Energy Symposium and Forum*, Tianjin, China, 2017.
9. Wenqi Cui, Yi Ding, **Hongxun Hui**, Maozhen Li, “Two-stage Payback Model for the Assessment of Curtailment Services Provided by Air Conditioners,” *Energy Procedia*, vol. 142, pp. 2050-6, Cardiff, UK, 2017.

SELECTED PATENTS

1. An Electrocardiogram Detection Device Based on Bluetooth Communication, No. CN201410094326.5, Mar. 2016. (Issued Patent)
2. A Dismantling Equipment for Electronic Devices Based on SCM, No. CN201410010721.0, May 2016. (Issued Patent)
3. A Self-powered Pinch Meter Based on Micro-generator and SCM, No. CN201410009920.X, Jul. 2016. (Issued

Patent)

4. A Calculation Method of Operating Reserve Capacity for Aggregated Air Conditionings, No. CN201610821647.X, May 2017. (Substantive Examination)
5. A Power Consumption Estimation Method Considering the Uncertainty of Electricity Prices, No. CN201710501055.4, Oct. 2017. (Substantive Examination)
6. An Intelligent Meter with Multi-time Scale Electricity Prices, No. CN201610543375.1, Oct. 2016. (Substantive Examination)
7. A Smart Home System Based on the Real-time Electricity Prices, No. CN201610540869.4, Oct. 2016. (Substantive Examination)
8. A Power Consumption Estimation Method Considering the Incentive Mechanism, No. CN201710502069.8, Nov. 2017. (Substantive Examination)

RESEARCH EXPERIENCES

Modeling and Potential Analysis of Flexible Loads

Nanjing, China

Supported by China Electric Power Research Institute (No. DZ71-15-004)

09/2015 – 06/2016

Position: Project director. Supervisor: Prof. Yi Ding

- Mathematical and physical model of typical flexible loads, such as air conditionings, EVs and batteries, are developed by MATLAB.
- The response characteristics, potential and uncertainty with real-time electricity prices are simulated.
- The proposed models and methods have been implemented in Jiangsu Province.

Research and Application of Demand Response

Nanjing, China

Supported by State Grid Jiangsu Electric Power Co., Ltd (No. KH20161699)

03/2016 – 11/2016

Position: Project director. Supervisor: Prof. Yi Ding

- The market mechanism and implementation plan of demand response projects are established for the existing electricity organization structure in China.
- The new spike price policy is implemented. According to the energy efficiency evaluation report in Jiangsu Province, the investments in power plants and transmission lines are postponed around 16.78 billion RMB.

Research on Peak-shaving Capacities and Operation Mechanisms of Flexible Loads

Hangzhou, China

Supported by State Grid Zhejiang Electric Power Co., Ltd (No. 5211JY15001S)

01/2016 – 12/2017

Position: Project director. Supervisor: Prof. Yi Ding

- Peak-shaving capacities of flexible loads are evaluated quantitatively, considering multiple uncertainties.
- The accessible abilities of renewable energies are evaluated considering loads participating in peak-shaving.
- The reliability and economy of the system before and after integrating demand response are evaluated.

Market Mechanism Design for Demand Response

Nanjing, China

Supported by Ministry of Science and Technology of China (No. 2016YFB0901103)

07/2016 – 06/2020

Position: Project director. Supervisor: Prof. Yi Ding

- A business model and a market framework are designed for loads participating in demand response project, including the determination of electricity prices, the transaction method, and the settlement method.
- Around 110,000 customers will be equipped with smart devices and participate in the project, which will be the largest demand response project in China.

Reliability Analysis and Optimization of Smart Grid Considering the Coordinated Operation of Flexible Resources and Wind Power

Hangzhou, China

Supported by National Natural Science Foundation of China (No. 51577167)

01/2016 – 12/2019

Position: Project participant. Supervisor: Prof. Yi Ding

- The basic mechanism causing multiple uncertainties of different types of flexible resources is analyzed.
- The reliability models and evaluation methods for power systems is proposed considering the coupling effects between wind power and flexible resources.

ADDITIONAL INFORMATION

Professional Services

- Vice President, IEEE Industry Applications Society Student Branch Chapter in Zhejiang University
- Reviewer of IEEE Transactions on Sustainable Energy (Since 2019)
- Reviewer, Applied Energy (Since 2018)
- Reviewer, Journal of Modern Power Systems and Clean Energy (Since 2018)
- Reviewer, IEEE Transactions on Industrial Electronics (Since 2017)

Computer Skills

- Programming languages: C/C++, Python, Java
- Professional software: MATLAB/SIMULINK, LabVIEW, Altium Designer, OrCAD, Altera Quartus, AutoCAD

Community Contribution

- A Volunteer in Affiliated Hospital of Zhejiang University School of Medicine
- A Lifetime Member in Future Entrepreneur Club, Zhejiang University