MENGSHUO JIA

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APPOINTMENTS

Senior Scientist 2023 - Present
Power Systems Laboratory, ETH Zürich, Switzerland

NCCR Automation Researcher 2023 - Present
National Centre of Competence in Research (NCCR), Switzerland

Postdoctoral Researcher 2021 - 2023
Power Systems Laboratory, ETH Zürich, Switzerland
Mentor: Prof. Gabriela Hug

EDUCATION

Visiting Ph.D., Electrical Engineering (onsite + online) 2019 - 2021
Power Systems Laboratory, ETH Zürich, Switzerland
Supervisor: Prof. Gabriela Hug

Ph.D., Electrical Engineering 2016 - 2021
Department of Electrical Engineering, Tsinghua University, China
Supervisor: Prof. Chen Shen

B.E., Electrical Engineering (Me ranked first in my major for 4 consecutive years) 2012 - 2016
Department of Electrical Engineering, North China Electric Power University, China

GRANT

Rethinking Power Systems Computation: Uncovering the Linearity Mechanism 2023 - 2024
Granted by Swiss National Science Foundation (No.221126) with a success rate of 20.6% *Single PI*

- Rethink power systems computation from a fundamental perspective
- Integrate innovative and non-traditional approaches to uncovering the linearity/nonlinearity mechanism.

ACADEMIC SERVICE

Journal Editors

- Associate Editor, IEEE Systems Journal (Impact Factor: 4.802)
- Associate Editor, IET Renewable Power Generation (Impact Factor: 3.034)

Conference Duties

- Technical program committee member for the Power Systems Computation Conference 2026
- Invited chair for the session "Load Flow and Power Quality" in IEEE PowerTech Belgrade 2023
- Reviewer for the Basil Papadias Best Paper Award in IEEE PowerTech Belgrade 2023

- Secretary support for Power Systems Computation Conference 2024
  (Developed an automated process for classifying all submissions and collecting/assigning ratings from all reviewers; coordinated with technical program committee members in terms of paper ratings; assigned all accepted papers to respective sessions.)

Peer Reviewers

- IEEE Transactions on Power Systems, IEEE Transactions on Smart Grid, IEEE Transactions on Industrial Informatics, IEEE Transactions on Industrial Application, IEEE Transactions on Transportation Electrification, IEEE Power Engineering Letters
- Applied Energy, Electrical Power System Research, Energy Conversion and Economics
- IET Generation, Transmission & Distribution, IET Renewable Power Generation, IET Smart Grid
- Power Systems Computation Conference, IEEE Power and Energy Society General Meeting, IEEE PowerTech Conference, International Conference on Probabilistic Methods Applied to Power Systems (PMAPS)

Organization Membership

- Member, IEEE
- Member, IEEE Power and Energy Society
- Member, IET

SELECTED WORKS

Working Monograph/Papers

W1. *Mengshuo Jia*, "Uncertainty Modeling, Probabilistic Analysis, and Stochastic Optimization of Multi-ISO-controlled Interconnected Grids", *funded by Springer Thesis Award*, in preparation, to be published in *Springer* as a monograph

W2. *Mengshuo Jia*, Yuxiao Liu, Yongxin Zhang, Zhimin Dang, Gabriela Hug, "Large-language-model-Based Automated Research on Capacitor", in preparation, to be submitted to *IEEE Transactions on Power Electronics*

W3. Yixiong Jia, *Mengshuo Jia** ✉, Yi Wang, Gabriela Hug, "Numerical Instability in Data-driven Optimization", in preparation, to be submitted to *IEEE Transactions on Power Systems*.

Preprint Papers

P1. *Mengshuo Jia*, Wen Yi Chan, Gabriela Hug. "Daline and DalineGPT: data-driven power flow linearization toolboxes for power systems research and education,", 2024

P2. *Mengshuo Jia*, Gabriela Hug, Ning Zhang, Zhaojian Wang, Yi Wang. "Data-driven Power Flow Linearization – Part I: Theory," 2024

P3. *Mengshuo Jia*, Gabriela Hug, Ning Zhang, Zhaojian Wang, Yi Wang. "Data-driven Power Flow Linearization – Part II: Simulation," 2024

P4. Yufan Zhang, *Mengshuo Jia*, Honglin Wen, Yuanyuan Shi. "Value-oriented Renewable Energy Forecasting for Coordinated Energy Dispatch Problems at Two Stages," 2024, preprint: https://arxiv.org/abs/2309.00803

Corresponding-authored Publications

S1. Mingyu Huang, Xueyuan Cui, Ning Zhang, *Mengshuo Jia** ✉, Yi Wang. "Optimal Planning of Standalone Net-Zero Energy Systems with Small Modular Reactors," *IEEE Transactions on Smart Grid*, 2024, early access, https://ieeexplore.ieee.org/document/10433761

S2. Aline Scherrer, Georgia Pierrou, *Mengshuo Jia** ✉, Marc Hohmann, Gabriela Hug. "Physics-Data-Driven AC Power Flow Linearization Considering Topological Remedial Actions," recently accepted by *IEEE PES General Meeting*, 2024, Seattle, WA, USA.

Journal Paper Publications

J1. *Mengshuo Jia*, Qianni Cao, Chen Shen, Gabriela Hug. "Frequency-Control-Aware Probabilistic Load Flow: An Analytical Method," *IEEE Transactions on Power Systems*, vol. 38, no. 6, pp. 5170-5187, Nov. 2023, https://doi.org/10.1109/TPWRS.2022.3223884

J2. *Mengshuo Jia*, Gabriela Hug, Yifan Su, Chen Shen. "Chance-constrained OPF: A Distributed Method with Confidentiality Preservation," *IEEE Transactions on Power Systems*, vol. 38, no. 4, pp. 3373-3387, July 2023, https://doi.org/10.1109/TPWRS.2022.3200941

J3. *Mengshuo Jia*, Gabriela Hug, Chen Shen. "Iterative Decomposition of Joint Chance Constraints in OPF," *IEEE Transactions on Power Systems*, vol. 36, no. 5, pp. 4836-4839, Sept. 2021, https://doi.org/10.1109/TPWRS.2021.3072541

J4. *Mengshuo Jia*, Yi Wang, Chen Shen, Gabriela Hug. "Privacy-preserving Distributed Clustering for Electrical Load Profiling," *IEEE Transactions on Smart Grid*, vol. 12, no. 2, pp. 1429-1444, March 2021, https://doi.org/10.1109/TSG.2020.3031007

J5. *Mengshuo Jia*, Yi Wang, Chen Shen, Gabriela Hug. "Privacy-preserving Distributed Probabilistic Load Flow," *IEEE Transactions on Power Systems*, vol. 36, no. 2, pp. 1616-1627, March 2021, https://doi.org/10.1109/TPWRS.2020.3022476

J6. *Mengshuo Jia*, Chen Shen, Zhiwen Wang. "A Distributed Probabilistic Modeling Algorithm for the Aggregated Power Forecast Error of Multiple Newly Built Wind Farms," *IEEE Transactions on Sustainable Energy*, vol. 10, no. 4, pp. 1857-1866, Oct. 2019, https://doi.org/10.1109/TSTE.2018.2873710

J7. *Mengshuo Jia*, Shaowei Huang, Zhiwen Wang, Chen Shen. "Privacy-preserving Distributed Parameter Estimation for Probability Distribution of Wind Power Forecast Error," *Renewable Energy*, vol. 163, no. 1, pp. 1857-1866, Jan. 2021, https://doi.org/10.1016/j.renene.2020.06.102

J8. *Mengshuo Jia*, Chen Shen, Zhaojian Wang. "A Distributed Incremental Update Scheme for Probability Distribution of Wind Power Forecast Error," *International Journal of Electrical Power and Energy Systems*, vol. 121, no. 1, pp. 106151, Oct. 2020, https://doi.org/10.1016/j.ijepes.2020.106151

J9. *Mengshuo Jia*, Qianni Cao, Sixuan Xu, Hui Cai, Zhenjian Xie, Chen Shen. "Analytical Probabilistic Load Flow Algorithm for Transmission Networks Considering the Constraints of Frequency Regulation Capacity," *Proceedings of the CSEE*, pp. 1-11, Feb. 2023 (In Chinese), https://kns.cnki.net/kcms/detail/11.2107.TM.20230220.1349.002.html

J10. Yi Wang, *Mengshuo Jia*, Ning Gao, Leandro Von Krannichfeldt, Mingyang Sun, Gabriela Hug. "Federated Clustering for Electricity Consumption Pattern Extraction," *IEEE Transactions on Smart Grid*, vol. 13, no. 3, pp. 2425-2439, May 2022, https://doi.org/10.1109/TSG.2022.3146489

J11. Qianni Cao, *Mengshuo Jia*, Chen Shen. "A Fault Detection Scheme for PV Modules in Large Scale PV Stations With Complex Installation Conditions," *Proceedings of the CSEE*, pp. 1917-1925, May 2022 (In Chinese), https://kns.cnki.net/kcms/detail/11.2107.tm.20210916.1438.010.html

J12. Qianni Cao, *Mengshuo Jia*, Li Boda, Chen Shen, Xue Xiaodai. "Decisions of a By-product Hydrogen Supply Chain for a Business Model of Large-scale Hydrogen Storage," *Journal of Tsinghua University (Science and Technology)*, pp. 1-14, May 2023 (In Chinese), https://kns.cnki.net/kcms/detail/10.16511/j.cnki.qhdxxb.2023.25.039.html

J13. Chen Shen, *Mengshuo Jia*, Ying Chen, Shaowei Huang, Yue Xiang. "Digital Twin of the Energy Internet and Its Application," *Journal of Global Energy Interconnection*, vol. 3, no. 1, pp. 1-13, 2020 (In Chinese), https://kns.cnki.net/kcms/detail/10.19705/j.cnki.issn2096-5125.2020.01.001.html

J14. Chen Shen, Qianni Cao, *Mengshuo Jia*, Ying Chen, Shaowei Huang."Concepts, Characteristics and Prospects of Application of Digital Twin in Power System," *Proceedings of the CSEE*, vol. 42, no. 2, pp. 487-499, 2022 (In Chinese), https://kns.cnki.net/kcms/detail/10.13334/j.0258-8013.pcsee.211594.html

J15. Yifan Su, Zhaojian Wang, Ming Cao, *Mengshuo Jia*, Feng Liu. "Convergence Analysis of Dual Decomposition Algorithm in Distributed Optimization: Asynchrony and Inexactness," *IEEE Transactions on Automatic Control*, vol. 68, no. 8, pp. 4767-4782, Aug. 2023, https://doi.org/10.1109/TAC.2022.3213608

J16. Zhaojian Wang, Feng Liu, Zhiyuan Ma, Yue Chen, *Mengshuo Jia*, Wei Wei, Qiuwei Wu. "Distributed Generalized Nash Equilibrium Seeking for Energy Sharing Games in Prosumers," *IEEE Transactions on Power Systems*, vol. 36, no. 5, pp. 3973-3986, Sept. 2021, https://doi.org/10.1109/TPWRS.2021.3058675

J17. Chuanyang Li, Yang Yang, Guoqiang Xu, Yao Zhou, *Mengshuo Jia*, Shaolong Zhong, Yu Gao, Chanyeop Park, Qiang Liu, Yalin Wang, Shakeel Akram, Xiaoliang Zeng, Yi Li, Fangwei Liang, Bin Cui, Junpeng Fang, Lingling Tang, Yulin Zeng, Xingtao Hu, Jiachen Gao, Giovanni Mazzanti, Jinliang He, Jianxiao Wang, Davide Fabiani, Gilbert Teyssedre, Yang Cao, Feipeng Wang, Yunlong Zi. "Insulating materials for realising carbon neutrality: Opportunities, remaining issues and challenges." ***High Voltage***, vol. 7, no. 4, pp. 610-632, July 2022, https://doi.org/10.1049/hve2.12232

J18. Chenyu Liu, Xuemin Zhang, Zhao Zhen, Shengwei Mei, *Mengshuo Jia*. "Multi-source Numerical Weather Prediction in Adaptive Wind Power Forecasting: Rank Bayesian Ensemble and Fluctuation Awareness," *Applied Energy*, vol. 313, no. 1, pp. 118769, May 2022, https://doi.org/10.1016/j.apenergy.2022.118769

Conference Paper Publications

C1. *Mengshuo Jia*, Gabriela Hug. "Overview of Data-driven Power Flow Linearization," *IEEE PowerTech Conference*, Belgrade, Serbia, pp. 01-06, 2023, https://doi.org/10.1109/PowerTech55446.2023.10202779

C2. Jia Mengshuo, Huang Shaowei, Tang Kexuan, Shen Chen. "An Investigation on the Applicability of the Integrated Method for Multi-Carrier Energy Flow Analysis," *IEEE Power and Energy Society General Meeting*, Portland, OR, USA, pp. 1-5, 2018, https://doi.org/10.1109/PESGM.2018.8585831

C3. Qianni Cao, Xuzhu Dong, Chen Shen, Jia Mengshuo. "Detection of Abnormal Status of PV Modules at PV Stations with Complex Installation Conditions," *IEEE Conference on Energy Internet and Energy System Integration*, Wuhan, China, pp. 1801-1806, 2020, https://doi.org/10.1109/EI250167.2020.9347229

C4. Yifan Su, Zhaojian Wang, Feng Liu, Peng Yang, Yunfan Zhang, Jia Mengshuo. "Hierarchical decomposition based distributed energy management of distribution networks," *Renewable Power Generation Conference*, Shanghai, China, pp. 1-7, 2019, https://doi.org/10.1049/cp.2019.0536

TEACHING

Course 1: Optimization in Energy Systems 2022 - Present

With Prof. Gabriela Hug, 32 hours, Spring Semester

· As a guest lecturer, I teach 2 primary lectures:

- Programming for Optimization
- Multi-time Step Optimization & Unit Commitment

· As a teaching assistant, I teach 3 exercise lectures:

- Unconstrained and Equality Constrained Optimization
- Inequality Constrained Optimization
- Solution methods for optimization problems - Interior point & Newton Raphson

· My other duties include providing Q&A sessions, designing and grading exams, and holding office hours.

Course 2: Power System Analysis 2021 - Present

With Prof. Gabriela Hug, 32 hours, Autumn Semester

· As the teaching assistant, I design and teach 7 exercise lectures:

- Unbalanced Load Flow Computations I
- Unbalanced Load Flow Computations II
- Unbalanced Load Flow Computations III & Synchronous Machine I
- Synchronous Machine II
- Power Swings I
- Power Swings II
- Voltage Stability

· My other duties include providing Q&A sessions, designing and grading exams, and holding office hours.

SUPERVISING

Ph.D. Students

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- Yixiong Jia, Research Topic: "Numerical Instability in Data-driven Optimization," *The University of Hong Kong*, co-supervised with Prof. Yi Wang from 2024 to present.
- Yongxin Zhang, Research Topic: "Large-language-model-Based Automated Research on Capacitor," *Tsinghua University*, co-supervised with Prof. Zhimin Dang from 2023 to present.
- Yuxiao Liu, Research Topic: "Large-language-model-Based Automated Research on Capacitor," *Tsinghua University*, co-supervised with Prof. Zhimin Dang from 2023 to present.
- Mingyu Huang, Research Topic: "Physics-data-driven Planning of Standalone Net-Zero Energy Systems," *The University of Hong Kong*, co-supervised with Prof. Yi Wang from 2023 to present.

Research Assistant

- Wen Yi Chan, Research Topic: "Manual development for Daline: a data-driven power flow linearization tool for power systems research and education," *ETH Zürich*, 2023 to present.

Master Students

- Deniz Tepe, Research Topic: "Privacy-preserving Distributed Framework for Load Pattern Recognition," Master thesis, *ETH Zürich & Technical University of Munich*, 2023.
- Wen Yi Chan, Research Topic: Numerical Evaluation of Data-driven Power Flow Linearisation Methods," Semester thesis, *ETH Zürich*, 2023.
- Jacopo Saracco, Research Topic: "Stochastic Risk Assessment of Power Grids via Cascading Failure Simulations," Master thesis, *ETH Zürich & EPFL*, 2022.
- Aoife Henry, Research Topic: "Online Electric Load Pattern Recognition," Master thesis, *ETH Zürich*, 2019.

Bachelor Students

- Aline Scherrer, Research Topic: "Physics-data-driven Linearization of AC Models in the Context of Remedial Actions," Bachelor thesis, *ETH Zürich*, 2023.
- Grace Lynch, Research Topic: "Evaluation on the Feasibility of 100% Renewable-electricity Systems," Projects & Seminars thesis, *ETH Zürich*, 2023.
- Miriam Ensslin, Research Topic: "Understanding and comparing Demand Response models," Projects & Seminars thesis, *ETH Zürich*, 2021.

SELECTED HONORS AND AWARDS

- **High Impact Paper**,
  Awarded by Proceedings of the CSEE — Jan. 2024
- **ESI Hot and Highly Cited Paper**,
  Awarded by Essential Science Indicators, Web of Science — Nov. 2023
- **First Prize of High-influence Papers**,
  Awarded by Chinese Society for Electrical Engineering, High Voltage Committee — April 2023
- **Springer Thesis Award**,
  Awarded by Springer — April 2022
- **Tsinghua Outstanding Ph.D. Graduate (only 2 winners in the department)**,
  Awarded by Tsinghua University — June 2021
- **Tsinghua Outstanding Ph.D. Thesis (only 6 winners in the department)**,
  Awarded by Tsinghua University — June 2021
- **Beijing Outstanding Ph.D. Graduate (only 6 winners in the department)**,
  Awarded by Beijing Ministry of Education — June 2021
- **First Prize Scholarship**,
  Awarded by Tsinghua University — November 2020

- **Excellent Administrative Assistant**,
  Awarded by Tsinghua University December 2018
- **Excellent Student Leader**,
  Awarded by Tsinghua University October 2017
- **Outstanding Graduates of Hebei Province, China**,
  Awarded by Hebei Ministry of Education, China March 2016
- **Principal Scholarship (highest honor, only 10 winners in the university, undergrad + grad)**,
  Awarded by North China Electric Power University December 2015
- **National Scholarship**,
  Awarded by the Chinese Ministry of Education November 2015
- **UHV Power Grid Scholarship**,
  Awarded by UHV Scholarship Fund October 2015
- **Meritorious Winner**,
  Awarded by the Consortium for Mathematics and Its Application, the U.S. June 2015
- **National Scholarship**,
  Awarded by the Chinese Ministry of Education November 2014
- **National Scholarship**,
  Awarded by the Chinese Ministry of Education November 2013

GRANTS AS PRINCIPAL PARTICIPANT

NCCR Automation 2023 - Present

Granted by Swiss National Science Foundation

· Investigate AI-powered pathfinders for fundamental challenges in power systems

· Develop an data-driven open-source toolbox that supports more than 50 linearizaion methods

An interconnected energy systems modeling platform: Nexus-e 2021 - 2023

Granted by Swiss Federal Office of Energy

· Propose data-driven power flow linearization methods for transmission and distribution grids

· Develop a stochastic risk assessment method for power grids via cascading failure simulations

Power grid planning method considering large scale offshore wind power integration 2021 - 2021

Granted by State Grid Corporation of China

· Propose a control-aware probabilistic load flow algorithm given large scale offshore wind power

· Design a capacity evaluation method for power grids with offshore wind power

Autonomous control and operation of distributed generation clusters 2018 - 2021

Granted by National Natural Science Foundation of China

· Propose two distributed probability modelling algorithms for distributed energy resources

· Propose a distributed computing method for probabilistic load flow

· Propose a distributed solution framework for chance-constrained OPF

Gaussian mixture model for uncertainty of distributed energy system 2018 - 2018

Granted by Siemens AG

· Develop a data-driven fault-screening technique for PV panels

· Develop a Gaussian-mixture-model-based toolbox for PV fault diagnosis

Voltage stability and dynamic reactive power compensation optimization 2016 – 2017

Granted by State Grid Corporation of China

· Implement small signal stability analysis for distribution grids

· Recognize weak zones in terms of voltage stability

· Identify optimal locations for reactive power compensations

Structure evolution mechanism of future transmission network 2014 – 2016

Granted by State Grid Corporation of China

· Design evaluation indicators for transmission network planning based on complex network theory

· Develop an evolution model for future transmission network

ADMINISTRATIVE SERVICE

Seminar Organizor and Chair, Tsinghua Uni. Alumni Association in Switzerland. 2023 – 2024

· Organized and chaired three seminars for visiting students and junior faculties from Tsinghua University.

· Invited speakers include faculties from world-renowned universities, senior staff of Google Zurich, and outstanding postdoctoral or Ph.D. students of ETHZ/EPFL.

Academic Assistant, Dept. Electrical Engineering, Tsinghua Uni. 2020 – 2021

· Co-organized the "Tsinghua University-IET" Electrical Engineering Academic Forum three times.

· Provided academic supports and services for all faculty members and graduate students.

Counselor, Dept. Electrical Engineering, Tsinghua Uni. 2018 – 2019

· Organized team buildings for fresh graduate students.

· Assisted fresh students in connecting with departmental and university resources.

· Guided fresh students through academic procedures to facilitate their transition into graduate studies.

Organizer, International-organization-oriented Excursion Team, Tsinghua Uni. 2019 – 2019

· Independently established contact with 10+ international organizations, including the United Nations, the World Trade Organization (WTO), etc.

· Organized 8+ interviews with international organization representatives.

· Gained recognition through extensive media coverage by outlets like Guangming Daily, The Paper, and Tsinghua News.

President, Graduate Student Union, Dept. Electrical Engineering, Tsinghua Uni. 2017 – 2018

· Elected as President with over 83% of the live vote, demonstrating widespread peer support.

· Served a community of nearly 600 graduate students within the department.

· Organized over 45 events encompassing cultural, sports, and academic activities.

REFERENCES

R1. Prof. Gabriela Hug, ETH Zürich, hug@eeh.ee.ethz.ch

R2. Prof. Chen Shen, Tsinghua University, shenchen@mail.tsinghua.edu.cn

R3. Prof. Ning Zhang, Tsinghua University, ningzhang@tsinghua.edu.cn

R4. Prof. Yi Wang, The University of Hong Kong, yiwang@eee.hku.hk

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Updated on March 2024