Chenxi Hu

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Department of Electrical and Electronic Engineering
The University of Hong Kong

EDUCATION

The University of Hong Kong *Sept.2021 - present*
Ph.D. candidate in Electrical Engineering (*HKU Presidential PhD Scholarship)*
Supervisor: Dr. Yunhe Hou / **Co-Supervisor**: Prof. K.T. Chau

Wuhan University *Sept. 2016 - Jun. 2020*
Major: B.E. in Electrical Engineering and Its Automation/ **Minor:** Finance GPA: 3.94/4.0

RESEARCH INTERESTS

Resilient Planning of Renewable-dominated Power System
Decision-Dependent Uncertainty Modelling and Quantification
Energy Storage and Hybrid Resources Coordinated Operation
Reinforcement Learning and Its Applications in Renewable Energy Systems

EXPERIENCE

Gangke Smart Power Holding Group Co., Ltd, Guangzhou, China *Mar. 2023 - present*
Technical Consultant

Ant Group, Shanghai, China *May 2021 – Aug. 2021*
Software Engineer Intern

University of California, Los Angeles, Los Angeles, U.S. *Jul. 2019 – Sep. 2019*
Research Intern, The Cross-disciplinary Scholars in Science and Technology (CSST) Program

New York University, Shanghai, Shanghai, China *Jun. 2018 – Aug. 2018*
Research Intern, The NYU Shanghai Summer Undergraduate Research Program (SURP)

RESEARCH PROJECT

Distributionally Robust Resilience Enhancement Strategy Against Ice Storms Considering Decision-Dependent Line Availability Uncertainty *Nov. 2023 – present*
Leading Researcher *The University of Hong Kong*

- Proposed a novel proactive network reconfiguration model to schedule power flows so as to reduce the glaze icing on power lines.
- Proposed a novel moment-based ambiguity set that simultaneously incorporates the relationship of line failure probabilities with both weather conditions (exogenous) and power flows (endogenous).
- Employed a parameterized column-and-constraint generation (C&CG) algorithm to effectively solve the established two-stage Robust Optimization with Decision Dependent Uncertainty.

Risk-informed Resilience Planning of Transmission Systems Against Ice Storms
Mar. 2023 – Oct. 2023
Leading Researcher *The University of Hong Kong*

- Developed a risk-informed resilient planning model by leveraging predictive information, emphasizing line hardening and energy storage siting and sizing decisions.
- Modelled and quantified the endogenous uncertainty of the predictive information, decision-dependent uncertainty from planning decisions and exogenous uncertainty from dispatchable resources.
- Employed the progressive hedging algorithm (PHA) to solve the large-scale mixed-integer linear programming problem.

Constructing the Steady-state Security Region of Power System *Sep. 2021 – Dec. 2022*
Leading Researcher *The University of Hong Kong*

- Constructed the DC power flow-based security region for the security assessment of renewable energy.
- Constructed the security region of AC power flow based on the Brouwer fixed-point theorem.
- Derived the explicit condition ensuring the existence of decoupled AC power flow solutions and estimate the error for the resulting security region.

Enhancing Resilience of Grid-Interactive Efficient Buildings Against Heat Waves Using Reinforcement Learning *May. 2023 – present*
Major Researcher *The University of Hong Kong*

- Developed an online resilience-oriented energy management method for the grid-interactive efficient building clusters via the Proximal Policy Optimization Algorithm.

Small-sample Transfer Learning Framework for Black Swan Events *Dec. 2020 – May 2022*
Leading Researcher *Wuhan University*

- Established a transfer learning framework to address black swan events with limited data.
- Constructed a mid-term load forecasting model for Central and Eastern China during the COVID-19 using Convolutional Neural Networks.

Dynamic Characteristics Analysis of Central China's Socio-economic Structure and Electricity Market based on Social Computing and Artificial Intelligence *Oct. 2019 – Dec. 2020*
Leading Researcher *Wuhan University*

- Constructed a mid-term load forecasting model based on Deep Belief Network using the economic and electricity data in China.
- Constructed a mixed-frequency load forecasting model using Long Short-Term Memory network.

PUBLICATION

In-progress Journal Papers

J1 **Chenxi Hu**, Yujia Li, and Yunhe Hou, "Risk-informed Resilience Planning of Transmission Grids Against Ice Storms." (About to be submitted to ***IEEE Transactions on Smart Grid***)

Journal Papers

J1 **Chenxi Hu**, Jun Zhang, et al, "Black swan event small-sample transfer learning (BEST-L) and its case study on electrical power prediction in COVID-19." ***Applied Energy***, vol. 309:118458, 2022.

J2 Yujia Li, Shunbo Lei, Wei Sun, **Chenxi Hu** and Yunhe Hou, "A Distributionally Robust Resilience Enhancement Strategy for Active Distribution Networks Considering Decision-dependent Contingencies," submitted to ***IEEE Transactions on Smart Grid***, 2023. (Accepted).

Conference Papers

C1 **Chenxi Hu**, Jiazuo Hou and Yunhe Hou, "Security Assessment of Power System with Stochastic Uncertainty Based on Steady-state Controllable Distance," *2022 IEEE PES Innovative Smart Grid Technologies - Asia (ISGT-Asia)*, 2022, pp. 434-438.

C2 **Chenxi Hu**, Hongxia Yuan, Jun Zhang,et al."Mid-Long Term Electricity Consumption Forecasting Analysis Based on Cyber-Physical-Social System Architecture," *16th International Conference on Automation Science and Engineering (CASE)*, Hong Kong, China, 2020, pp. 564-569.

C3 Yujia Li, **Chenxi Hu**, and Yunhe Hou, "The Value of Ambiguity Quantification in Distributionally Robust Economic Dispatch Models for the Wind-Penetrated Power System," *2023 IEEE PES Generation Transmission and Distribution Conference & Exposition Asia*, 2023. (Accepted)

INVITED TALKS

T1 October 2023, "Risk-Informed Resilience Enhancement of Transmission Grids Against Ice Storms", *2023 INFORMS Annual Meeting*, Phoenix, U.S.

T2 July 2023, "Enhancing Resilience of Grid-Interactive Efficient Buildings Using Reinforcement Learning", *IEEE PES General Meeting*, Orlando, U.S.

T3 October 2022, "Information-theoretic Method in Power System", *2022 INFORMS Annual Meeting*, Indianapolis, U.S.

T4 October 2022, "Security Assessment of Power System with Stochastic Uncertainty Based on Steady-state Controllable Distance", *2022 IEEE Innovative Smart Grid Technologies - Asia*, Singapore.

SKILLS

Programming Languages and Frameworks

- Proficient in using Python, Julia, MATLAB/Simulink; Experienced in C
- Skilled with optimization solvers (Gurobi, CPLEX, Mosek etc.)

TEACHING EXPERIENCE

- **Power system analysis and control**, Teaching Assistant, 2023/2024
- **Power Systems Capstone Workshop**, Teaching Assistant, 2024

AWARDS AND SCHOLARSHIPS

- **HKU Presidential PhD Scholarship** *Sep. 2021*
  Awarded by the University of Hong Kong
- **Outstanding Graduate** *Jun. 2020*
  Awarded by Wuhan University
- **The Ultra High Voltage(UHV) Scholarship** *Nov. 2019*
  Awarded by the State Grid Corporation of China
- **The Cross-disciplinary Scholars in Science and Technology Scholarship** *Jun. 2019*
  Awarded by the University of California, Los Angeles
- **National Scholarship (Top 2%)** *Nov. 2018*
  Awarded by the Chinese Ministry of Education
- **Wuhan University First-class Scholarship** *Nov. 2018*
  Awarded by Wuhan University
- **National Scholarship (Top 2%)** *Nov. 2017*
  Awarded by the Chinese Ministry of Education
- **Wuhan University Freshman Scholarship** *Sep. 2016*
  Awarded by Wuhan University