Xiangyu Ma

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Room 518, Experiment Building No.3, Dalian University of Technology, Dalian, P.R.China

RESEARCH INTERESTS

Reservoir (hydropower) operation, water-energy-food-ecosystem nexus, water resources management

EDUCATION

Dalian University of Technology   Dalian, China
Degree: Master   GPA: 3.70/4   Sep 2021 - Present
Major: Hydrology and Water Resources
Advisor: Dr. Shengli Liao
Dissertation: Research on the water-energy-ecosystem nexus and multi-objective decision analysis in hydro-based power systems
Courses: Optimization Method (90), Mathematical Statistics (93), Water Resource System Analysis (94), Operation Theory about Electricity Power and Hydropower Systems, Risk Analysis and Control

Dalian University of Technology   Dalian, China
Degree: Bachelor   GPA: 3.26/4   Sep 2017 - Jun 2021
Major: Water Conservancy and Hydropower Engineering
Dissertation: Research on power generation scheduling of cascade hydropower stations in Lancang River under electricity market environment
Courses: Engineering Hydrology (89), Hydropower and New Energy, Economic Operation of Hydropower Stations, Basics of Water Informatics, Hydropower Information System and Database

RESEARCH EXPERIENCE

Research on the water-energy-ecosystem nexus in hydro-based power systems   Apr 2023 - Present

- Suggested a multi-timescale two-layer nested framework to investigate the water-energy-ecosystem nexus in hydro-based power systems.
- The outer layer is a long-term, high-resolution, multi-objective water management model (with water levels as decision variables) that balances multi-sectoral performance including water supply, hydropower production, and sub-daily hydrological regime (hydropeaking).
- The inner layer is a scenario-based stochastic programming model (with power output as decision variables) that optimizes the operation of renewables-dominated power systems.

Research on multi-objective decision analysis for hydropower system   Aug 2022 - Mar 2023

- Proposed a multi-objective mixed integer linear programming (MILP) model to coordinate conflicting demands in short-term hydropower operation, including peak shaving, ship navigation, and power generation.
- Developed a solution and decision-making framework using Normalized Normal Constraint (NNC) and TOPSIS methods for generating Pareto solutions and facilitating decision analysis.

Research on multi-objective co-scheduling of giant and re-regulation reservoirs   Feb 2022 - Jul 2022

- Employed constraint aggregation, trilinear interpolation, and SOS2 constraints to model and address high-dimensional nonlinear constraints in hydropower operation, resulting in improved solution efficiency.
- Established a multi-objective optimization model based on Normal Boundary Intersection (NBI) and MILP to coordinate the conflicts between peak shaving and shipping.

Practice of basic methods in water resources system (Python)   Sep 2021 - Jan 2022

- Optimization methods for reservoir optimal operation: Genetic Algorithm (GA), Dynamic Programming (DP), Non-dominated Sorting Genetic Algorithm II (NSGA-II), etc.
- Machine learning methods for runoff forecasting : Artificial Neural Network (ANN), Support Vector Regression (SVR), Seasonal AutoRegressive Integrated Moving Average (SARIMA), etc.

PUBLICATIONS

Xiangyu Ma, Shengli Liao, Benxi Liu, Hongye Zhao, Chuntian Cheng, Huaying Su. Multi-objective solution and decision-making framework for coordinating the short-term hydropeaking-navigation-production conflict of cascade hydropower reservoirs. Journal of Cleaner Production. 2023. 422. 1386-1402. (JCR Q1, IF=11.1)

Shengli Liao, Huan Wang, Benxi Liu, **Xiangyu Ma** , Binbin Zhou, Huaying Su. Runoff forecast model based on an EEMD-ANN and meteorological factors using a multicore parallel algorithm. Water Resources Management. 2023. 37(4). 1539-1555. (JCR Q1, IF=4.3)

Shengli Liao, Hualong Yang, Benxi Liu, Hongye Zhao, Huan Liu, **Xiangyu Ma**, Huijun Wu. Daily peak-shaving model of cascade hydropower serving multi-grids considering an HVDC channel shared constraint. Renewable Energy. 2022. 199. 112-122. (JCR Q1, IF=8.7)

Huijun Wu, Shushan Li, Hongbing Tang, **Xiangyu Ma**, Xi Zhang, Shengli Liao. MILP method for multi-objective short-term optimization scheduling of cascaded hydropower stations coupling peak-shaving and navigation demands. Electric Power Automation Equipment, 2023. (EI, in Chinese)

HONORS AND AWARDS

The Science & Technology Star Scholarship — Oct 2023
Top 5%, CCCC Water Transportation Consultants Co., Ltd

First Prize Scholarship of Dalian University of Technology — Oct 2023
Top 5%, Dalian University of Technology

Excellent Graduate of Dalian University of Technology — Sep 2023
Top 5%, Dalian University of Technology

Second Prize Scholarship of Dalian University of Technology — 2021 - 2022
Dalian University of Technology

Third Prize in Structural Design Competition of Dalian University of Technology — Jun 2019
Dalian University of Technology

SKILLS

Languages	Chinese (native), English (IELTS, 7.0)
Programming	Python, MATLAB, C, R
Software	Gurobi (Optimizer), ArcGIS, Adobe Illustrator, Origin
Python Packages	Geatpy (Evolutionary Algorithm), Scikit Learn, Tensorflow
Typesetting	MS office, Latex, Markdown