Peilin Wang, Chengguo Su, Hangtian Guo, Biao Feng, Wenlin Yuan and Shengqi Jian, 2024, Information gap decision-making theory-based medium- and long-term optimal dispatching of hydropower-dominated power grids in a market environment, *Water,* Volume 16 Issue 17 10.3390/w16172407.

Abstract In the high-proportion hydropower market, the fairness of the execution of traded electricity and clean energy consumption are two issues that need to be considered in medium- and long-term dispatching. Aiming at the fairness of medium- and long-term optimal dispatching of hydropower-dominated grids and the problem of water abandonment in the power market environment, this paper proposes a medium- and long-term optimal dispatching method for hydropower-dominated grids based on the information gap decision-making theory (IGDT). Firstly, IGDT is used to establish a two-layer model of medium- and long-term optimal dispatching that considers runoff uncertainty, in which the lower layer solves the maximum value of the maximum difference in the contract power completion rate of the power stations, and the upper layer solves the maximum fluctuation range of the interval inflow. Then, a mixed-integer linear programming (MILP)-based single-layer optimization model is obtained through a variety of linearization techniques, and the model is solved via the CPLEX solver (version 12.10.0). The medium- and long-term optimal dispatching of 10 thermal power stations and 22 hydropower stations in Yunnan Power Grid, China, is taken as an example to verify the proposed model. The results show that the maximum difference in the contracted electricity completion rate of each power station is 0.412, and the amount of abandoned hydropower is reduced by 81.33% compared to when the abandoned water penalty function is not considered. It is proved that the proposed model can effectively alleviate the problems of excessive power generation, insufficient power generation and large-scale hydropower abandonment, which are of great significance for realizing the fair dispatching of hydropower-dominated power grids and promoting clean energy consumption in the market environment.

Keywords hydropower-dominated power grids; information gap decision-making theory; runoff uncertainty; dispatching fairness; mixed-integer linear programming

\website\IGT\wang-su-guo-etal2024abs.tex 29.8.2024