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An impact analysis of time-scale on accuracy rating of cascade generation dispatch model

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With the increasing operation of hydropower stations in basin, a refined generation dispatch model becomes more urgently for the precise control of cascade hydropower stations under deterministic runoff, such as rules extraction by simulation operation under long series runoff, optimal dispatch level evaluation of historical operation process. However, most study on refined generation dispatch model focused on the refined description of transform relationships between hydro energy and electric energy or hydraulic connection between cascade hydropower stations. Time scale of dispatch model, which is another important factor affecting the the accuracy of dispatch model, was short of attention. The time scale of dispatch model affects the the the accuracy of dispatch model in a complex way by influences of other factors. This paper attempt to discover the influence between time scale and the the accuracy of dispatch model by both theoretical analysis and case study. The control variable method and progressive analytical method were used to uncover the key factors which affect the accuracy of dispatch model and analyze its influence rule qualitatively. Case study of cascade hydropower stations downstream Jinsha River has been down to analyze influence between time scale and the the accuracy of dispatch model by these factors. With modeling analysis in different inflow conditions and water level control strategies, we have uncovered key factors which affect the accuracy of dispatch model quantitatively. Then we propose a multi time-scale generation dispatch model for accurate description of the dispatch problem. Simulation results show that the theoretic results proposed in this paper is sound. Moreover, the proposed model has a better performance on both accuracy and efficiency compared with other models, which means that this model can be used to historical operation evaluation and dispatch rules extraction of cascade hydropower stations downstream Jinsha River.