



An Optimization Study on the Asymmetric Inlet of Spillway

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Abstract: The spillway is one of the main outlet structures of the water control project, and its type and layout have a direct influence on the engineering safety. In the context of practical hydraulic engineering, this study investigates the hydraulic characteristics within the inlet section of the spillway based on physical modeling experiments and numerical simulation tests. The three-dimensional numerical simulation was carried out with the aid of RNG turbulence model to simulate and investigate a variety of inlet arrangement schemes. As a result, a more economical and reasonable arrangement scheme has been recommended based on the optimization analysis. Then the results of the numerical simulation were verified by physical modeling experiment. It can be concluded that the layout type of straight wall in front of the spillway inlet could exert an important impact on the overall flow regime, the velocity distribution, and the discharge capacity of the spillway. Furthermore, by adding two parallel straight walls at the spillway inlet, several unfavorable phenomena, such as the water-depth discrepancy between the two sides of the spillway and the water-wings near the side walls, could be effectively improved and the spillway discharge capacity was increased. Consequently, the requirements of the engineering design can be satisfied.

Keywords: Inlet of Spillway; Asymmetric Flow; Model Experiment; Numerical Simulation; Turbulence Model

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