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3-D REAL DAM RESERVOIR MODEL FOR SEASONAL THERMAL DENSITY FLOW

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Abstract

The efficient use of fresh water sources and proper modeling of the water quality can only be possible when flows in the dam reservoir are well defined. Therefore, in this study, a hydrodynamics model of an actual dam reservoir in three dimensions for simulating a real dam reservoir flows for summer season is created. The model is developed using nonlinear and unsteady continuity, momentum, energy and k-ε turbulence model equations. In order to include the Coriolis force effect on the flow in a dam reservoir, Coriolis force parameter is also added the model equations. Those equations are constructed using actual dimensions, shape, boundary and initial conditions of the dam and reservoir. Temperature profiles and flow visualizations are used to evaluate flow conditions in the reservoir. The model successfully simulates the formation of density currents and the thermal characteristics of the reservoir system for seasonal heat exchanges. Model simulations results obtained for summer season are compared with field measurements obtained from gauging stations founded on the dam reservoir. The results are found to be in accordance with the actual values measured. This investigation can be also useful for sedimentation studies, water quality modeling and management, and habitat assessment in a reservoir.

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