عنوان مقاله:

Hydrodynamics Analysis of Density Currents

محل انتشار:

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خلاصه مقاله:

Density Current is formed when a fluid with heavier density than the surrounding fluid flows down an inclined bed. These types of flows are common in nature and can be produced by; salinity, temperature inhomogeneities, or suspended particles of silt and clay. Driven by the density difference between inflow and clear water in reservoirs, density current plunges clear water and moves towards a dam, while density current flows on a sloping bed. The vertical spreading due to water entrainment has an important role in determining the propagation rate in the longitudinal direction. In this work, two-dimensional steady-state salt solutions' density currents were investigated by means of experimental studies and data used in turn to verify the numerical model. In the laboratory experiments, the density current enters the channel via a sluice gate, into a lighter ambient fluid and it moves down-slope. Experiments were performed for different concentrations and discharges. Vertical velocity distributions were measured at various stations by Acoustic Doppler Velocimeter (ADV). Results showed a variety of phenomena depending strongly on the entrance buoyancy flux, and Richardson number. As the discharge increases, maximum velocity and current thickness increase as well, but when concentration decreases, the current thickness increases. In the numerical simulation, the governing equations were solved numerically and k-ω turbulence model was used for closure. The buoyancy term was implemented in the numerical model and its constant was calibrated by experiments. For verification, the height and velocity profiles of the dense layer .were compared with the experimental data and a good agreement was found

کلمات کلیدی:

Density current, K, ω Turbulence Model, Laboratory Experiments, Numerical modeling