Numerical Analysis of Submerged Turbulent Buoyant Jet in River Mouth

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The purpose of this study is to investigate the characteristics of submerged turbulent buoyant jet in river mouth by simulating basic fluid mechanisms. The numerical model composes two-dimensional continuity equation, momentum equation, and advective diffusion equation. Since our model is building on basic fluid mechanics formulas, we can test the movement of buoyant jet in the river mouth depends on different parameters, such as environmental and geometrical factors. One of our focuses will be how the phenomena be influenced by inflow hydrograph and sediment concentration, as well as real events and analyze their effect submerged turbulent buoyant jet motion pattern.

Our model will be applied to simulated several characteristic behaviors that are consistent with prior knowledge, including: (1) the inflow concentration is higher at the fixed inflow rate and calculation time, the formed buoyant jet has a large influence range and higher concentration; (2) when the inflow rate is high in a fixed flow concentration and calculation time, the generated buoyant jet has a large influence range and that shape more bulging. Moreover, we will adjust the downstream boundary conditions. When the downstream water level is high, the range and the duration time of the buoyant jet are great. As expected, the concentration of the same location is also higher than other situation that has a lower downstream water level. So far, this model will progress to the extent that it can capture the overall trend of buoyant jet movements, and this simulation is based only on the physical mechanism of the sand-containing fluid itself.

Keywords: Submerged Turbulent Buoyant Jet, River Mouth, Numerical Analysis, Finite-Difference Methods, Buoyancy, Plume

