Abstract Submitted
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Large-eddy simulation of density currents on inclined beds[1]
SAURABH CHAWDHARY, ALI KHOSRONEJAD, St. Anthony Falls Laboratory, University of Minnesota, Minneapolis, USA, GEORGE CHRISTODOULOU, Department of Civil Engineering, National Technical University of Athens, Athens, Greece, FOTIS SOTIROPOULOS, St. Anthony Falls Laboratory, University of Minnesota, Minneapolis, USA — Density currents are stratified flow in presence of density differential and gravity field. We carry out Large-Eddy Simulation (LES) to simulate the flow of a density current formed over sloped bed due to an incoming jet of heavy density salty water for two different cases of bed slope: (a) 5 degrees and (b) 15 degrees. The Reynolds and Richardson numbers based on inlet height and inlet velocity were (a) 1100 and 0.471, and (b) 2000 and 0.0355, respectively. The Schmidt number is set equal to 620, which corresponds to the value for salt-water. The computed results are compared with laboratory experiments in terms of overall shape of the heavy-density plume and its spreading rate and are shown to be in reasonable agreement. The instantaneous LES flow fields are further analyzed to gain novel insights into the rich dynamics of coherent vortical structures in the flow. The half-width of the plume is plotted as a function of downstream length and found to exhibit three different regions on a log scale, in agreement with previous experimental findings.

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