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Three-dimensional Dynamics of the Gravity Current Flow past a Submerged Cylinder ESTEBAN GONZALEZ-JUEZ, ECKART MEIBURG, UCSB, GEORGE CONSTANTINESCU, TALIA TOKYAY, U. of Iowa, UCSB COLLABORATION, U. OF IOWA COLLABORATION — The three-dimensional dynamics of the gravity current flow past a submerged cylinder are investigated by means of large eddy simulations. The geometries considered are a bottom-mounted rectangular cylinder and a circular cylinder mounted above a bottom wall. The Reynolds number is of O(100). The agreement with previous experimental measurements of the drag and lift coefficients is excellent. The simulation for the rectangular cylinder case shows that the gravity current front's lobe-and cleft structure sets the characteristic length of the spanwise variation of the drag during impact, while an unsteady cellular flow structure upstream of the cylinder sets this characteristic length during the later quasi-steady stage. The simulation for the circular cylinder case shows during the quasi-steady stage the shedding of primary Karman vortices, the presence in the near wake of, apparently, secondary mode-B streamwise vortices, and an interaction further downstream between the Karman vortices and the boundary layer at the bottom wall and the shear layer between the two fluids.

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