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Process of entrainment in particulate gravity currents[1] MRUGESH SHRINGARPURE, University of Florida, JORGE SALINAS, MARIANO CANTERO, Institute Balseiro, Bariloche Atomic Center, San Carlos de Bariloche, Rio Negro, Argentina, S. BALACHANDAR, University of Florida — Various geophysical flows like turbidity currents, river flows, dust storms etc transport huge quantities of dispersed phase over large distances. Typically in such flows a dispersed phase rich layer is swept along with the flow. The amount of dispersed phase carried depends on the dynamics of this layer which are governed by a strong coupling between turbulence and suspended particles. This layer evolves, i.e., grows/shrinks in size, due to entrainment/detrainment of surrounding clear fluid at its interface (where a sharp change from particle rich fluid to surrounding clear fluid occurs). Also in many applications there is entrainment and detainment of particles at the bottom boundary due to settling and resuspension. The entrainment processes that occur here have important consequences. Consistent entrainment means the flow is energetic enough to mix/distribute the dispersed phase layer in the bulk flow. To study these processes, we introduce a layer of suspended particles into a fully turbulent channel flow and capture the entrainment processes in detail. Three parameters - Reynolds number, particle size and Richardson number dictate the entrainment process. Various simulations have been performed that explores this parametric space and identifies various entrainment regimes.

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