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Bottom Boundary Layer Turbulence under an Internal Solitary Wave of Depression: Effects of Barotropic Current TAKAHIRO SAKAI, PETER DIAMESSIS, Cornell University, GUSTAAF JACOBS, San Diego State University — The development of the bottom boundary layer (BBL) in the footprint of an internal solitary wave of depression is investigated by means of spectrally accurate numerical simulations in two and three dimensions. The focus is on the subsequent generation and ejection of vortices that potentially leads to bed sediment resuspension. Our preliminary study, based on two-dimensional simulations, has indicated that introduction of a barotropic current enables the formation of a robust separation bubble in a region of adverse pressure gradient over the bed. As a result, the production of packets of instability waves from the separation bubble, which evolve into vortices intermittently shed into the water column, is greatly enhanced. In the present study, the effect of barotropic current is investigated in detail for different wave amplitudes and stratification profiles with the wave Reynolds number up to the order of 10^5. This parametric study is performed in idealized, two-dimensional flow fields, in which fully-nonlinear, fully-nonhydrostatic wave field obtained by solving the DJL equation is adopted as a base state flow. Some preliminary results will be presented from three-dimensional Large Eddy Simulations which have been performed for a select set of governing parameters to explore the transition into turbulence in the BBL.

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