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Near-bottom instabilities induced by nonlinear internal waves of depression[1] THEMISTOKLIS STEFANAKIS, PETER DIAMESSIS, Cornell University — Results are presented from 2-D Direct Numerical Simulations (DNS) of the bottom boundary layer (bbl) in the footprint of fully nonlinear internal waves (NLIWs) of depression propagating in a uniform-depth two-layer system. Use of a spectral multidomain penalty method enables a robust and accurate description of the wave-induced bbl at values of Reynolds number (based on NLIW phase speed and wave-guide depth) as high as 100,000. The critical NLIW amplitude for global instability in the NLIW-driven bbl is identified as a function of Reynolds number, oncoming current strength and layer thickness ratio. The structure of of bbl vorticity and bottom shear stress fields is examined along with timeseries obtained of the near-bed vertical velocity fields obtained from Lagrangian and Eulerian virtual point sensors. DNS results are compared to recent laboratory observations, followed by a discussion of the underlying implications for the field.

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