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The benthic boundary layer under fully-nonlinear internal solitary waves of depression YUNCHENG LIN, LARRY REDEKOPP, University of Southern California — Long internal waves are common features on the continental shelf and in lakes, but their dissipation via benthic boundary layer drag is largely unknown, particularly when the wave amplitudes are large and boundary layer corrections based on linear theory are clearly invalid. In general, the wave-induced boundary layer experiences a continuous favorable-to-adverse variation of the pressure gradient, undergoes transition, may reach a strongly turbulent state, and frequently separates near the point of maximum adverse pressure gradient in the lee of the wave. In this study a model for fully-nonlinear solitary waves of depression in a two-layer stratification is employed as the inviscid base state, and a RANS solver with k-ω turbulence model is used to compute the stationary boundary layer under the wave. Local friction coefficients and eddy viscosities are computed in the footprint of the wave. Locations of boundary layer separation are computed as well as the integrated frictional drag over the region of attached boundary layer flow. Boundary layer characteristics are presented for a range of environmental conditions, Reynolds numbers, and surface roughness in an attempt to provide a quantitative measure of the frictional drag of long internal waves in realistic, shallow environs.

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