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Velocity and Stress in the Deep-Ocean Boundary Layer

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ABSTRACT

In order to predict the response of deep ocean sediments to the near-bottom currents, accurate estimates of the near-bottom velocity and the boundary shear stress are necessary. Because of the unsteady nature of deep ocean currents, dynamic models are required. This can be accomplished either by time stepping methods or by the use of Fourier transform techniques. Here the latter is applied to the momentum equation and the results are compared to data from the HEBBLE region in the North Atlantic Ocean. An eddy viscosity is employed for closure; however, because the unsteady nature of the problem requires it to vary in time, the uniform one-dimensional Ekman layer equations become nonlinear. Results show that if the Fourier transform method includes the turbulence adjustments in this way, it predicts very accurately both stress and velocity fields.

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