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Missed set of boundary layers in the environmental fluid mechanics

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Dynamics of waves in the environment is studied rather actively; less is known about a structure of 3D boundary layers. In this study results of theoretical and experimental investigations of 3D periodic motions in a stratified and rotating environment are presented. From classification of complete set of eigen-forms for linearized 3D periodic motions follows that any periodic motion consist of the waves and two kinds of viscous boundary layers. These layers are placed on solid surfaces and have analogues in a stratified fluid interior. One of the layers corresponds to the classical periodic flow and in limiting case of a homogeneous liquid transforms into the Stokes layer. Missed before internal boundary layer is specific for stratified or rotating fluid. A thickness of this boundary layers depends on universal micro length scale and specific geometrical factors, describing slope of waves and of a solid emitting or reflected surface. Constructed solutions of 2D and 3D periodic and attached waves generation problems do not contain empirical factors and fit in experimental data rather good. Diffusivity and heat conductivity effects enlarge a number of distinguished boundary layers. In nonlinear wave mechanics all components of the motion interacts between themselves expanding a number of possible scenario of the system evolution. Internal waves can be nonlinearly produced by boundary layers. Some examples of flow visualization illustrating internal waves and internal boundary currents are presented.