Geophysical Research Abstracts, Vol. 7, 00830, 2005
SRef-ID: 1607-7962/gra/EGU05-A-00830

Waves and boundary layer on a strip moving on a sloping trajectory a stratified environment

1 Roman N Bardakov

Institute for Problems in Mechanics of the RAS, Moscow, Russia, bard@ipmnet.ru

A problem of generation disturbances by a plane strip uniformly moving on a sloping trajectory in a viscous exponentially stratified fluid is studied analytically and numerically. Boundary conditions are no-slip for velocity and decay of all disturbances on infinity. Exact solutions are constructed taking into account all set of roots of a dispersion relation and visualized using modern PC soft. The solution describes upstream transient internal waves, two kinds of downstream stationary (lee) internal waves and boundary layers on the moving strip and on the rigid surface beneath it. Fields of vector (velocity, vorticity, density gradients) as well as scalar parameters (density, pressure) are visualized numerically and compared with asymptotic calculations in approximation of weak stratification and small viscosity. Calculations are compared with side view of flow pattern in stratified brine by different schlieren methods. Profiles of upstream velocity are visualised by long density markers. Asymptotic calculations are consistent with exact solution and the laboratory results in limited areas past the obstacle. With increasing of towing velocity the boundary layer split on sub-layers and motion of sloping streaky structures is observed. Extrapolation on an environmental condition is discussed.