Geophysical Research Abstracts, Vol. 9, 00395, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-00395

Dynamics of 3D periodic internal wave beams and concomitant singular elements

R. N. Bardakov and A.Yu. Vasiliev
Institute for Problem in Mechanics of the RAS, Russia, bard@ipmnet.ru

We study analytically, numerically and experimentally dynamics of formation of 3D periodic internal wave beams by a piston oscillating in a continuously stratified liquid. Linearized set of governing equations is solved by Fourier expansion method taking into account all roots of dispersion relation. We have distinguished regular elements that are beams of transient and periodic internal waves and singular elements that are set of boundary layers on contact solid surfaces and interfaces in a fluid interior. Numerical visualization reveals high gradient inner and outer envelops of the internal wave beam. In laboratory experiment singular envelops of internal wave beams are visualized. Converging envelops leads to formation of vortices inside a fluid. These fast vortices are similar to autocumulative jets near a free body oscillating on a horizon of neutral buoyancy. Animations illustrating process of waves and vortices formation is presented. Extrapolation on environmental conditions is discussed.