Geophysical Research Abstracts
Vol. 14, EGU2012-1279, 2012
EGU General Assembly 2012

Loss of energy in transition of internal solitary wave over the bottom step

T. Talipova (1), K. Terletska (2), V. Maderich (2), I. Brovchenko (2), R. Grimshaw (3), and E. Pelinovsky (1)

(1) Applied Physics Institute, Department of Nonlinear Geophysical Processes, Nizhny Novgorod, Russia, (2) Department of Marine and River Systems, Institute of Mathematical Machine and System Problems, Kiev, Ukraine, (3) Department of Mathematical Sciences, Loughborough University, UK

The significant role of the internal waves in the processes of water mixing and energy dissipation is well-known. Intense water mixing is observed the ocean shelves and underwater mountains and banks, where the intensive internal waves are generated by barotropic tide and destroyed due to propagating over the non-uniform bottom relief and horizontally variable water stratification. It is interesting to discuss the simplest situation when the internal solitary wave passes over bottom step and transforms part of its energy into eddies, turbulence and mixing. The problem is solved here using the fully nonlinear Navier-Stokes equations in the numerical tank with two-layer flow. Both polarities of incident internal solitary wave are considered. The range of parameters when asymptotic theory is applicable is found. Formation of the Kelvin-Helmholtz billows, eddies near the step and boluses is studied also. The estimations of energy losses for both internal solitary wave polarities show that they are not monotonically varied to respect ratio of step height to incident internal solitary wave amplitude.