



Internal waves of large amplitudes in the ocean with variable depth: analytical solutions and numerical modeling

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Joint Russian-Ukrainian research project (2009-2010) is presented. Its main goal is the study of the moderate and strongly nonlinear internal waves in the ocean of variable depth. Analytically, the nonlinear internal waves are analyzed in the framework of the nonlinear evolution equations like the variable-coefficient Korteweg – de Vries and Gardner equations. Numerical modeling is performed within full nonlinear Euler and Navier-Stokes equations. Scientific tasks of this project include: i) soliton and breather shoaling in the basin of variable depth, ii) soliton transformation on the bottoms step, iii) transformation and breaking of nonlinear internal waves in the turning points, where nonlinear coefficients tend to zero, iv) the existence of the “non-reflected” bottom configurations for interfacial waves, v) breather generation by the barotropic tides, vi) internal wave runup on underwater slope. Obtained results are summarized in the presentation.