Geophysical Research Abstracts
Vol. 14, EGU2012-120, 2012
EGU General Assembly 2012

Soliton propagation over a submarine hill: The variable-coefficient Korteweg - de Vries framework

M Cannalire and E. Pelinovsky

Applied Physics Institute, Department of Nonlinear Geophysical Processes, Nizhny Novgorod, Russian Federation

An evaluation of solitary wave transformations in a basin of variable depth is essential for understanding and predicting the effects of a wave impact on the coast. In this paper we apply the variable-coefficient Korteweg-de Vries equation to study the transformation of solitary waves propagating above a submarine hill. We implemented the following computational setting: a solitary wave, of given amplitude started from an initial zone at a constant (maximum) depth, entered in a zone characterized by a decreasing depth approaching the top of the submarine hill (minimum depth), and then it propagated to the zone of constant depth. Important characteristics of soliton transformation are: the ratio of the wave amplitude to depth (nonlinearity parameter) and the ratio of the soliton length to the hill's width (bathymetry smoothness). We explored several scenarios of the wave transformation with fission of the secondary solitary waves. In our computations two conserved quantities in Korteweg – de Vries theory: generalized mass and energy flux, were verified. The results of the numerical simulations were compared with the predictions of adiabatic soliton theory and linear wave theory for inhomogeneous media.