Geophysical Research Abstracts, Vol. 7, 01845, 2005
SRef-ID: 1607-7962/gra/EGU05-A-01845

1 Solitary surface wave transformation above the periodic and random piecewise-constant seabed

O. Nakoulima (1), **N. Zahibo** (1), E. Pelinovsky (2),T. Talipova (2)

(1) Laboratoire de Physique Atmospherique et Tropicale, Departement de Physique , Universite Antilles Guyane, Pointe-a-Pitre, France

(2) Laboratory of Hydrophysics and Nonlinear Acoustics, Institute of Applied Physics, Nizhny Novgorod, Russia

For many physical applications the characteristics of the leading wave can be important. For instance, tsunami travel time and possible damage may be estimated by using the leading wave characteristics (Kajiura, 1963; Pelinovsky, 1996, Tadepalli and Synolakis, 1996). Solitary pulse propagation above a periodic piecewise-constant seabed is studied in the framework of the weakly nonlinear – dispersive theory for the specific conditions when the obstacle length is larger than the pulse width. Simplified formulas known in the linear shallow-water theory can be used for the pulse transformation at each step in linear long theory as well as in weakly nonlinear – dispersive theory. If the obstacle is short (to compare with the characteristic nonlinear and dispersive scales), the wave propagation can be described fully by the linear shallow-water theory. Decrement of the leading wave is calculated in the explicit form. If the obstacle is long (its length exceeds the nonlinear and dispersive scales), the leading transmitted wave keeps its soliton shape in the average according to the Korteweg - de Vries theory. Decrement of the leading soliton is calculated also in the explicit form. Soliton decrement is related with two processes: wave scattering and soliton fission. Averaged wave decrement for linear pulse above the random topography is in good agreement with calculations for deterministic periodic seabed, and also with experimental data (Belzons *et al*, 1988). It is shown also that the soliton decrement is very sensitive to the features of the bottom geometry to compare with linear pulse decrement.