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Korteweg-de Vries and Boussinesq Equations and Nonlinear Transformation Solitary Waves at a Bottom Step

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Dynamics of water waves in coastal zone is very difficult because of variety of acting factors: nonlinearity, dispersion, irregularity of underwater bottom and so on. Tsunami wave is very striking example of influence of bottom relief. Practically imperceptible in the ocean, these waves greatly intensify near shore zone. The model of solitary waves is very often used for description of dynamics of real waves. The objective of this work is to study the

nonlinear transformation of solitary wave at bottom steps of various geometry. The analysis was obtained from two points of view: classical Korteweg-de Vries equation (analytical solution) and extended high-order Boussinesq equation in form of Wei (numerical solution). Limits of application of KdV analytical solution was determined. Very good agreement between analytical and numerical solution was obtained in this range. Under this range, when effect nonlinearity are very significant, set very interest effects, unknown before, was observed.