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Transformation of the interfacial solitary wave of at the bottom step

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The propagation of internal solitary wave over the bottom step in the two-layer flow is studied. It leads to the soliton formation in the reflected and transmitted waves. Numerical modelling of the process of the soliton fission is performed in the framework of the Navier-Stokes equations for density stratified fluid. In numerical experiments, the ratio of initial wave amplitude to layer thickness is varied up 0.5, and nonlinear effects become essential. It is shown that solitary wave shape obtained in numerical experiments can be described by the soliton solution of the Gardner equation (extended version of the Korteweg – de Vries equation). In average, the characteristics of the secondary generated solitons obtained in fully nonlinear computations are in reasonable agreement with predictions of the weakly nonlinear theory based on matching the linear shallow-water theory in the vicinity of a step and the Korteweg – de Vries equation for waves far from a step. The difference between predictions of the weakly nonlinear theory and full nonlinear computations is mainly in the wave locations and less in the wave amplitudes.