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Large amplitude internal solitary waves in two-layer shallow water

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The evolution of large amplitude internal solitary waves propagating towards the shore as the subsurface waves of depression is studied. It is shown that in laboratory experiments such flows could be simulated by internal symmetric solitary waves of mode 2 (“lump-like” waves). The mathematical model describing solitary waves propagating, interaction and decaying has been derived. The exact solution representing the waves of permanent form for sharp interfaces is found. It is shown by the comparison between experimental data and numerical results that the rate of wave decay before and after interaction can be predicted by the model to a high accuracy.
The run-up phase of the bottom solitary internal waves through “the swash zone” up to the “burst phase” of breaking has been investigated experimentally. It is demonstrated that existence of rather thin bottom layer of dense fluid upstream the solitary wave could prevent breaking process comparing with internal wave propagating over the “dry bottom”.
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