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Nonlinear interaction of large-amplitude unidirectional waves in shallow water

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Nonlinear interaction of long unidirectional waves is studied numerically in the framework of nonlinear shallow water theory in a basin of constant depth. The interaction of two initially separated unidirectional waves occurs only when the waves (transformed into the shock waves) overtake each other. It is demonstrated that the interaction of two large-amplitude wave crests results in the formation of one shock wave of triangular shape, which is qualitatively similar to the outcome of the nonlinear interaction of two weak-amplitude waves. The formation of shock waves from initially negative disturbances (wave troughs) is accompanied by the generation of reflected waves of negative polarity. These waves additionally influence the process of interaction. The interaction of waves of opposite polarities is possible only when the leading wave is negative.