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Freak waves in the field of the nonlinear non-dispersive shallow-water waves

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The formation of rogue waves is studied in the framework of nonlinear hyperbolic systems with an application to the nonlinear shallow water waves. It is shown that the nonlinearity in the random Riemann (travelling) wave, which manifests in the steeping of the face-front of the wave, does not lead to the extreme wave formation. At the same time the strongly-nonlinear Riemann wave can not be described by the Gaussian statistics for all components of the wave field. It is shown that rogue waves can appear in nonlinear hyperbolic systems only in the result of nonlinear wave-wave or/and wave-bottom interaction. Two special cases of wave interaction with a vertical wall (interaction of two Riemann waves propagating in opposite directions) and wave transformation in the basin of variable depth are studied in detail. Open problems of the rogue wave occurrence in nonlinear hyperbolic systems are discussed.