



Large-amplitude simple and shock waves in shallow water

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Nonlinear deformation of shallow water waves is studying numerically and analytically. Main attention is paid to the large-amplitude waves with negative polarity (troughs). In this case the nonlinear parameter (Mach number), which is defined as ratio of the particle speed to the wave speed, is varied in wide range and can be much bigger than one. The process of the wave transformation to the shock wave (bore) is qualitative the same for any initial amplitudes, and an amplitude of the shock wave at large times changes accordingly to predictions of weakly nonlinear theory. If the initial wave amplitude is too big, the reflected wave is appeared during the shock wave forming and it also transforms to the shock wave. Amplitude of the reflected wave is proportional to initial amplitude with exponent three (as it is predicted by weakly nonlinear theory) in wide range of amplitude variation, with the exception of abnormally large nonlinearity.