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Experimental and Numerical Study of Wave Breaking

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Due to present computational constraints, time-domain modeling of large-scale wave evolution in the nearshore zone requires approximate equations. Boussinesq-type equations are becoming increasingly popular for this task. In this paper, the accuracy impact of using high-order Boussinesq-type models as compared to the typical order models is examined. The high-order model used is the two-layer model of Lynett and Liu [1]. The physical situations examined all involve nearshore breaking is adopted for the two-layer model. One-horizontal dimension setups are the focus of this paper. It is shown that high-order models show significant benefit very near to the breaker line. The nonlinearity of the waves tested ranges from 0.029 to 0.180. The overall comparisons between the two-layer model and the hydraulic experiments are quite good. The one-layer (fully nonlinear extended Boussinesq) model overshoals the wave near the breakpoint, while the two-layer model shoals at a rate more consistent with the experimental data. References[1] Lynett, P. and Liu, P. L.-F. (2004). A two-Layer approach to water wave modeling. Proc. Royal Society of London A., 460, 2637-2669.