

Extreme Wave Runup and Overtopping

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Abstract

Accurate estimations of irregular wave runup at sloping beaches and overtopping of coastal structures due to extreme waves are important in assessments of coastal erosion and flood risk. Here, runup is defined as the vertical elevation of the shoreline position, driven by swash oscillations about the wave setup level. This presentation will describe a 1-D model of wave transformation, run-up and overtopping, based on enhanced Boussinesq equations for non-breaking waves and nonlinear shallow water equations for broken waves. Model verification and validation test results will be presented for run-up and overtopping by solitary wave and compact wave groups. Results from the numerical model will be used to highlight the need for second-order paddle correction, and the rather major ramifications for coastal overtopping tests discussed. The presentation will describe how a modified version of the model can be used to produce statistical information on the runup of irregular waves, arising from a random sea state offshore of the beach. A validated technique will be presented for simulating long-duration irregular runup time series whereby the incident waves are generated using second-order accurate paddle motions with reflected waves effectively absorbed before they reach the paddle