

Abstract Submitted
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Generation of the maximum breaking wave amplitude by means of unidirectional wave focusing IVAN SAVELYEV, ROBERT HANDLER, US Naval Research Laboratory — This work overviews existing methods and proposes new approach for the wave breaking generation in wave tanks. Due to dispersive nature of surface gravity waves, a unidirectional wave packet can be pre-programmed to focus its energy at a desired location in space and time. In this work, frequency modulated packets were generated by means of a single flat paddle hinged at the bottom. Two methods proposed within our approach reveal strong nonlinear wave envelope modulation in high amplitude regimes. Wave packets with high steepness were found to deviate from linear expectations by shifting their energy towards the leading edge. If left uncorrected, such modulation leads to defocusing of the wave energy, causing breaking waves to be less energetic and to appear prior to the desired location. Various empirical corrections were tested to account for the modulation, among which only the phase shift correction for the second method proved to be successful. Based on this finding, a wave generation procedure is established, which allows to simulate large wave breaking events and their interaction with various structures and vessels.

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