



Effects of occasional wave breaking on extreme wave statistics in stochastic modeling

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Experimental results on measurement of steep surface wave groups in deep water in the Large Wave Chanel in Hannover are discussed [Shemer & Sergeeva, 2009; Shemer et al 2010a, b]. The initial conditions were set as quasi-random waves with the pre-defined spectral shape and random phases. The retrieved data of the evolution of the ensemble of wave realizations was later used for the statistical analysis of extreme wave events. In stochastic experiments with various initial spectral conditions, regimes with occasional wave breaking were observed (the total energy loss during the propagation for about 80 wavelengths is estimated up to 15%). Simultaneously, the high frequency part of power spectra was slowly going down. The wave breaking effect on the statistics of unidirectional irregular waves and spectral evolution is analyzed.

The occasional wave breaking effect in stochastic numerical simulations is usually parameterized through introducing the high-frequency wave dissipation, or cutting-off the breaking waves, etc. Then the numerical scheme represents a system with energy leakage, but with no pumping. The performed laboratory experiments on irregular JONSWAP wave stochastic dynamics give the basis for parameterization of this kind, and are compared with the results of numerical stochastic simulations of broad-banded unidirectional sea waves.

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