



Probability Distribution Functions of freak-waves: nonlinear vs linear model

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No doubts that estimation of probability of freak-wave appearing at the surface of ocean has practical meaning. Among different mechanisms of this phenomenon linear dispersion and modulational instability are generally recognized. For linear equation of water waves Probability Distribution Functions (PDF) can be calculated analytically and it is nothing but normal Gaussian distribution for surface elevation. Or it is Rayleigh distribution for absolute values of elevations. For nonlinear waves one can expect something different.

In this report we consider and compare these two mechanism for various levels of nonlinearity. We present results of numerical experiments on calculation of Probability Distribution Functions for surface elevations of waters waves both for nonlinear and linear models. Both model demonstrates Rayleigh distribution of surface elevations. However dispersion of PDF for nonlinear case is much larger than for linear case.

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