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Abstract View

A New Statistical Distribution for the Surface Elevation of Weakly Nonlinear Water Waves

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ABSTRACT

A new statistical distribution for the surface elevation of weakly nonlinear water waves is derived using the Pearson System of distributions. The new distribution avoids some problems associated with previously proposed distributions. Namely, its probability density function is positive everywhere, unlike prior results obtained with Gram–Charlier series. Furthermore, it is derived without requiring the assumptions that the wavefield is unidirectional and narrow band, as made in some earlier studies. The distribution obtained is a form of the beta distribution and depends only on two parameters, the variance and the skewness of the sea surface elevation. The new distribution is compared to wave data, measured on a reservoir, and found to give a reasonable fit.

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