Geophysical Research Abstracts, Vol. 7, 00526, 2005
SRef-ID: 1607-7962/gra/EGU05-A-00526

Spectral model of sea surface waves

R. Berton
ONERA, Chemin de la Hunière, F-91761 Palaiseau cedex, France

By numerical analysis of a trochoidal wave profile, it is shown that the one-dimensional PSD fits a log-normal distribution with coefficients which are functions of a parameter q, equal to the product of the wave number k_0 and the gyration radius r of the trochoid ($0 \leq q \leq 1$). When q=0, the sinusoid is retrieved and when q=1, the trochoid is very steep.

In one dimension, it is shown that the Pierson-Moskowitz spectrum is close to that of a trochoid with q=0.12. In two dimensions, a trochoidal PSD and a JONSWAP profile as azimuthal function are adopted. The synthesised elevations look like those of Pierson-Moskowitz model with small q, and include more and more wavelets as q gets closer to unity. Moreover, the greater q is, the broader the marginal distributions of slopes are.

This latter point shows that the profile shape will have an influence on the radiance of the sea surface illuminated by the Sun, because this radiance can be expressed as a function of the global distribution of slopes. The difference between the waves generated by both types of spectra – Pierson-Moskowitz and trochoid – is reflected in the progressively increasing width of that slope distribution as q increases, whereas no asymptotic behaviour of skewness and kurtosis is found.