Abstract View

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On the Steady-State Energy Balance of Short Gravity Wave Systems

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ABSTRACT

Steady-state energy balances of short gravity wave systems generated in a wave tank with and without airflow have been measured and compared with the predictions of perturbation theory. Wind-wave spectra were found to fit a JONSWAP form to a good approximation if a wind-dependent equilibrium range coefficient was used. Mechanically generated waves were produced which had frequency spectra similar to wind-generated wave spectra and which exhibited nonlinear effects through a decrease in the spectral peak frequency with fetch. In the wind-wave case, perturbation theory well predicted the difference between the net source function and energy input from the wind for a wide range of fetch and wind speed conditions provided that surface tension was properly taken into account. In the case of waves generated without airflow, perturbation theory predicted energy transfer rates much smaller than the measured values.