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Computations and Parameterizations of the Nonlinear Energy Transfer in a Gravity-Wave Spectrum. Part I: A New Method for Efficient Computations of the Exact Nonlinear Transfer Integral

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ABSTRACT

A more efficient method of computing the nonlinear transfer in a surface wave spectrum is developed which is symmetrical with respect to all wavenumbers of the resonant interaction quadruplets. This enables a large number of computations to be carried out, as required for investigations of the spectral energy balance or the development of parameterizations. New results are presented for finite-depth surface waves. By filtering out regions in interaction phase space, the assumptions involved in the narrow-peak and local-interaction approx-imations are investigated. Both approximations are found to be useful but are generally not sufficiently accurate to replace exact computations or provide adequate parameterizations for wave models.

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