



A general model for the nonlinear evolution of coastal mixed spectra

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We derive a general formulation for the evolution of a mixed wave spectrum (edge and leaky waves) over a laterally uniform beach using the Fourier-Sturm-Liouville decomposition. The dynamic equation model is based on the Hamiltonian formalism (Zakharov 1968) and describes interactions between edge-edge, edge-leaky and leaky-leaky triads of waves. The subharmonic resonance mechanism for edge-wave excitation (Guza and Davis, 1974) is retrieved from the model a special case. For simplified beach profiles (e.g., a plane beach), we examine the resonance conditions and discuss the possibility of a kinetic closure. The model allows for investigating the evolution of the statistics of mixed spectra, including kurtosis and probability of anomalously-large wave events.