Discussion

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The demonstration by Professor Whitham and Dr Brooke Benjamin that a periodic Stokes wave is unstable to small perturbations of frequency and amplitude is extremely interesting, and I wish to congratulate the authors on their fine work. The result appears revolutionary in view of the sustained efforts to prove the mathematical existence of a Stokes wave. But from another aspect the result is perhaps less surprising. In any wave spectrum, the resonant nonlinear interactions have an irreversible tendency to spread the wave energy evenly over all wavenumbers. A narrow spectral peak may therefore be expected to broaden. That this occurs for gravity waves in deep water has been verified by computations (Hasselmann 1963). This is equivalent, however, to saying that an almost periodic Stokes wave is unstable to its side-band energies.

Reference (Hasselmann)

Hasselmann, K. 1963 *J. Fluid Mech.* **15**, 273 (see footnote on p. 281).