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16. Applications

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Coupled evolution equations and the stability of stratified flows

The problem of resonant waves which occur on the interface of two horizontal fluids in uniform laminar motion is studied. The waves arise when two harmonics of the fundamental travel at the same speed. Using the method of multiple scales, in both space and time, a pair of coupled nonlinear Schrodinger type equations are derived. These model the propagation of the interface profile, correct up to cubic order. Solutions to the equations in the form of Stokes type waves are sought, corresponding to sinusoidal wave profiles. The stability of the waves against plane wave perturbations is examined .