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Stability of finite-amplitude interfacial periodic waves

We study the instability of the periodic motion of the interface between two unbounded homogeneous fluids of different density in the absence of background currents. Using an unsteady conformal mapping technique with a suitable representation of the interface, the linear stability problem for finite-amplitude interfacial waves is reduced to a generalized eigenvalue problem. Numerical results show that the wave-induced Kelvin–Helmholtz (KH) instability is the major instability mechanism when the dominant wavenumbers of disturbances are greater than a critical value. In addition, the present study extends the previous results for the small-wavenumber instability, such as modulational instability, of relatively small-amplitude waves to finite-amplitude ones.