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Stability and structure of fields of a flow with a hydrodynamic discontinuity DV ILYIN, WA GODDARD III, California Institute of Technology, USA, Y FUKUMOTO, Kyushu University, Japan, SI ABARZHI, The University of Western Australia, AU — We consider from a far field the evolution of a hydrodynamic discontinuity separating incompressible ideal fluids of different densities, with mass flow across this interface. By solving the boundary value problem and finding fundamental solutions of linearized dynamics, we directly link interface stability to structure of the flow fields. We find that classic Landaus system of equations for the Landau-Darrieus instability has a degenerate and singular character. Eliminating this degeneracy leads to appearance of a neutrally stable solution whose vortical field can seed the instability. We further find that the interface is stable if the flux of energy fluctuations produced by the perturbed interface is small compared to the flux of kinetic energy across the planar interface. The interface is unstable otherwise. Landaus solution is consistent with the latter case.

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