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Inviscid linear stability analysis of two fluid columns of different densities subject to gravity[1] ADITYA PRATHAMA, CARLOS PANTANO, Univ of Illinois - Urbana — We investigate the inviscid linear stability of vertical interface between two fluid columns of different densities under the influence of gravity. In this flow arrangement, the two free streams are continuously accelerating, in contrast to the canonical Kelvin-Helmholtz or Rayleigh-Taylor instabilities whose base flows are stationary (or weakly time dependent). In these classical cases, the temporal evolution of the interface can be expressed as Fourier or Laplace solutions in time. This is not possible in our case; instead, we employ the initial value problem method to solve the equations analytically. The results, expressed in terms of the well-known parabolic cylinder function, indicate that the instability grows as the exponential of a quadratic function of time. The analysis shows that in this accelerating Kelvin-Helmholtz configuration, the interface is unconditionally unstable at all wave modes, despite the presence of surface tension.

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