ON THE EXISTENCE OF A CONTINUOUS SPECTRUM IN SUPERNOVA REMNANTS: THE RAYLEIGH-TAYLOR INSTABILITY REVISITED

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The Rayleigh-Taylor instability (RTI) can be helpful in analyzing astrophysical flows, as in the case of supernova remnants interacting with the circumstellar medium. In the present work we investigate the linear Rayleigh-Taylor instability of an interface of two superposed fluids with exponential density in plane geometry. This approximation is appropriate for supernova remnants, because the temperature is a slowly varying function of both coordinate and time near the contact discontinuity1. The fluids are considered to be infinite, compressible and isothermal. The lower fluid is of decreasing exponential density, while the upper fluid is of increasing exponential density. In order to show how the modes appear in the response of a surface discontinuity to an initial perturbation, we consider the initial value problem (IPV). It was found useful to phrase of stability as initial value problem (IPV) in order to ensure the inclusion of certain continuum modes otherwise neglected. In addition to discrete mode (surface mode), a set of continuum modes due to a branch cut in the complex plane, not treated explicitly in the literature, appears. It will be seen that an ambiguity of the usual normal mode method is avoided. 2-4.


