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Hydrodynamic instabilities and Boundary Value Problem SNEZHANA I. ABARZHI, University of Chicago, Chicago, IL, USA — For the first time, on the basis of conservation principles and thermodynamics laws, we derive the generalized Rankine-Hugoniot conditions that can be applied for unsteady and curved fronts. The conditions describe the dynamics of the interface (front) in an explicit and covariant form and can be employed in convergent or Cartesian system of coordinates for three-dimensional systems. The theoretical framework is applied to the instabilities of Landau-Darrieus (LD), classical Rayleigh-Taylor (RT) and ablative Rayleigh-Taylor (ART). It is shown that in the case when if there is mass flux across the interface and no acceleration (LD), the front can be unstable only if the energy flux across the front is imbalanced. When acceleration is present (RT and ART), the dependence is obtained of the instability growth-rate on the mass flow and energy imbalance across the front. Connection between the ablative RTI and classical RTI is made. The stabilization mechanisms are discussed. The obtained results provide a theoretical framework for design of experiments under conditions relevant to inertial confinement fusion.

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