NONLINEAR RAYLEIGH-TAYLOR GROWTH IN CONVERGING GEOMETRY*

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The early nonlinear phase of Rayleigh-Taylor (RT) growth is typically described in terms of the classic models of Layzer [1] or Davies & Taylor [2] in which bubbles of light fluid rise into the heavy fluid at a constant rate determined by the bubble radius and the gravitational acceleration. However, these models are strictly valid only for planar interfaces and hence ignore any effects which might be introduced by the spherically converging interfaces of interest in ICF. The work of G. I. Bell [3] and M. S. Plesset [4] introduced the effects of spherical convergence on RT growth but only for the linear regime. Here, a generalization of the Layzer nonlinear bubble rise rate is given for a spherically converging flow of the type studied by Kidder [5]. A simple formula for the bubble amplitude is found showing that, while the bubble initially rises with a constant velocity similar to the Layzer result, during the late phase of the implosion, an acceleration of the bubble rise rate occurs. Analytical results are compared with numerical simulations using the Hydra code [6].

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