Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Linear Analysis of Rayleigh-Taylor Instability Between Immiscible Compressible Fluids in Cylindrical Geometry HUIDAN YU, CCS-2/CNLS, Los Alamos National Lab, DANIEL LIVESCU, CCS-2, Los Alamos National Lab — A linear stability analysis for the Rayleigh-Taylor instability (RTI) between two ideal inviscid compressible immiscible fluids in cylindrical geometry is performed. 3D cylindrical as well as 2D axisymmetric and circular unperturbed interfaces are considered and compared to the Cartesian case with planar interface. Focuses are on the effects of compressibility and geometrical convergence (or divergence) on the instability growth and the differences between implosion (gravity acting inward) and explosion (gravity acting outward). Compressibility can be characterized by two parameters - static Mach number based on isothermal sound speed and ratio of specific heats - which in general have opposite influence, stabilization and destabilization, on the instability growth, similar to the Cartesian case [D. Livescu, *Phys. Fluids.* **16**, 118 (2004)]. Instability is found to grow faster in the 3D cylindrical case than in the Cartesian case in implosion but slower in explosion. In general, the difference between implosion and explosion is profound for the cylindrical cases but marginal for planar interface. For the 3D cylindrical case, instability grows faster in implosion than in explosion. For the 2D cases, the results above can be qualitatively different, depending on the Atwood numbers, interface radius, and compressibility parameters.

Huidan Yu
CCS-2/CNLS, Los Alamos National Lab

Date submitted: 02 Aug 2007 Electronic form version 1.4