Numerical calculations are performed for composite target material (Au-foam) as well as (SF6 -Air).Results obtained would be useful for target design in ICF and studying EOS of material.

References

[1] D.Livescu Phys. Fluids. **16**, 118, (2004)
[2] Goncharov PRL, **88**, 134502, 2002.

P-68.

Effect of viscosity and surface tension on the growth of Rayleigh-Taylor Instability and Richtmyer-Meshkov instability under nonlinear domain

Rahul Banerjee, M. Khan, L. K. Mandal, S. Roy and M. R. Gupta
Dept. of Instrumentation Science & Centre for Plasma Studies
Jadavpur University, Kolkata-700032, India
E-mail: rbanerjee.math@gmail.com

The Rayleigh-Taylor(R-T) instability and Richtmyer-Meshkov(R-M) instability are well known problems in the formation of some astrophysical structures such as the supernova remnants in the Eagle and Crab nebula. A core collapse supernova is driven by an externally powerful shock, and strong shocks are the breeding ground of hydrodynamic instability such as Rayleigh-Taylor Instability or Richtmyer-Meshkov instability. These instabilities are also important issues in the design of targets for inertial confinement fusion (ICF). In an ICF target, a high density fluid is frequently accelerated by the pressure of a low density fluid and after ablation the density quickly decays. So, small ripples at such an interface will grow. Under potential flow model, the perturbed interface between heavier fluid and lighter fluid form bubble and spike like structures.
The bubbles are in the form of columns of lighter fluid interleaved by falling spike of heavy fluid. In this paper, we like to presented the effect of viscosity and surface tension on Rayleigh-Taylor instability and Richtmyer-Meshkov instability under the non-linear Layzer's[1] approach and described the displacement curvature, growth and velocity of the tip of the bubble as well as spike. It is seen that, in absence of surface tension the lowering of the asymptotic velocity of the tip of the bubble which is formed when the lighter fluid penetrates into the denser fluid and thus encounters the viscous drag due to the denser fluid, which depends only on the denser fluid's viscosity coefficient. On the other hand the asymptotic velocity of the tip of the spike formed as the denser fluid penetrates into the lighter fluid is reduced by an amount which depends only on the viscosity coefficient of the lighter fluid and the spike is resisted by the viscous drag due to the lighter fluid. However, in presence of surface tension the asymptotic velocity of the tip of the bubble (spike) and nonlinear perturbed surface are oscillating under certain conditions. For Rayleigh-Taylor Instability this oscillation depends only on the surface tension but for Richtmyer-Meshkov instability it depends on surface tension as well as viscosity.

References

[1] D. Layzer, Astrophys. J., **122**, 1 (1955).