Mitigation of the Richtmyer-Meshkov instability in Plasmas

Takayoshi Sano
Institute of Laser Engineering, Osaka University
e-mail (speaker): sano@ile.osaka-u.ac.jp

We investigate several effects proposed to stabilize the RMI by numerical simulations. A strong magnetic field can suppress the growth of the RMI when the Alfvén number, which is the ratio of the linear growth velocity to the Alfvén speed, is less than unity [1,2]. The vorticity deposited at the interface right after the incident shock refraction is the driving source of the RMI growth, while the vorticity left in the bulk of the fluids has been proved to be a physical agent that decreases the growth of the contact surface ripple [3]. We also focus on the effect of a density transition layer on the suppression of the RMI. When the transition layer becomes broader than the modulation wavelength, the perturbed velocity associated with the RMI is reduced considerably [4].

Figure 1. Dependence of the integrated kinetic energy measured at the nonlinear regime on the thickness of the transition layer L. Various parameter runs listed in Table I are plotted with different marks. The gray thick curve is the fitted function of all the data, which are proportional to \[1 + \left(\frac{qL}{\lambda}\right)^p\] with \(q = 2.11\) and \(p = 2.46\).

References