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Effect of viscosity and resistivity on Rayleigh-Taylor (RT) instability induced mixing in inertial confinement fusion (ICF) plasmas[1]

RATAN BERA, CAMILLE SAMULSKI, BHUVANA SRINIVASAN, Virginia Tech, JOSHUA SAUPPE, JOHN KLINE, Los Alamos National Laboratory — Rayleigh-Taylor (RT) instabilities can occur during both the acceleration and deceleration phase of the implosion in inertial confinement fusion (ICF) settings leading to the undesirable mixing of hot and cold plasmas. Understanding the mechanism of such instabilities for experimentally relevant parameter space provides potential means to mitigate its growth and achieve ignition-grade hot-spots. Here, we numerically investigate the RT and magneto-RT instability using experimental parameters given by Sauppe et al. [*MRE 4, 065403 (2019)*] to study the impact of external magnetic fields in cylindrical implosions. The studies incorporate self-consistent effects of viscosity and resistivity. The simulations have been carried out using plasma fluid models in PHORCE (Package for High ORder simulations of Convection-diffusion Equations) based on the unstructured discontinuous Galerkin finite element method. Using magnetohydrodynamic depiction without and with external magnetic fields, it has been shown that the presence of self-consistent dissipation in the system drastically changes the nature of the instability within the deceleration phase (7ns). We also provide useful insight into the RT induced turbulence in such high energy density plasmas.

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