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Direct Numerical Simulations of Magnetic Rayleigh-Taylor Instability in ICF Coasting Stage ZHAORUI LI, Texas A&M University, DANIEL LIVESCU, Los Alamos National Laboratory — The development of hydrodynamic instabilities is generally believed to be one of the main obstacles to achieving economically controlled inertial confinement fusion (ICF). In this study, accurate simulations of 2D magnetic Rayleigh-Taylor instability (RTI) under ICF coasting stage conditions have been conducted with a newly developed high-order two-fluid plasma solver (Li and Livescu, 2019), in which full transport terms, including temperature and magnetic field dependent ion and electron heat fluxes and viscous stresses, are implemented. The numerical results show that, for the initial configuration with small Atwood number (0.33) and high hot-spot temperature (10 keV), the extremely large heat conduction and viscous stresses completely suppress the RTI development. Instead, the late-time RTI and magnetic field can grow to structures close to those seen in previous studies, which relied on numerical transport to regularize the equations, only when unrealistically small transport coefficients are used for calculating heat conductivity and viscosity. Further simulations with realistic transport phenomena are being conducted with more relevant ICF coasting stage conditions (e.g. Weber *et al.* 2014) in which Atwood number is 0.875 and hot-spot temperature is 2.25 keV.

Zhaorui Li
Texas A&M University

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