Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Generation and Growth of Magnetic Fields in Rayleigh-Taylor Unstable Plasmas BHUVANA SRINIVASAN, GUY DIMONTE, XIANZHU TANG, Los Alamos National Laboratory — It has long been expected that Rayleigh-Taylor instabilities in ICF implosions can generate magnetic fields. To investigate this, a Hall-MHD model is used with the discontinuous Galerkin method in the code, WARPX (Washington Approximate Riemann Plasma). 2-D single-mode and multi-mode studies of a Rayleigh-Taylor instability are performed in a stratified two-fluid plasma. Self-generated magnetic fields are observed and these fields grow ($\sim 10^2$T) as the Rayleigh-Taylor instability progresses. The $\nabla n_e \times \nabla T_e$ term in the generalized Ohm's law is responsible for the formation of a self-generated magnetic field. In the absence of this term in Ohm's law, no magnetic field forms. Scaling studies are performed to determine the growth of the self-generated magnetic field as a function of density, gravity, and perturbation wavelength. The magnetic field increases as the wavelength decreases, and as gravity increases, which is consistent with theory. Additionally, the MHD dynamo term, $v \times B$, is expected to further increase the magnetic field that is formed. An investigation of the coupling and growth of the MHD dynamo with the self-generated out-of-plane fields will enable us to estimate how large the fields will grow in 3-D.

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Date submitted: 19 Jul 2011 Electronic form version 1.4