Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Magnetohydrodynamic simulation comparisons of cylindrical implosion experiments for Rayleigh Taylor instability[1] NOMITA VAZIRANI, JOHN KLINE, KIRK FLIPPO, SASIKUMAR PALANIYAPPAN, JOSHUA SAUPPE, Los Alamos National Lab, SCOTT ENGLAND, WAYNE SCALES, Virginia Tech — The Rayleigh-Taylor (RT) hydrodynamic instability degrade the performance of inertial confinement fusion (ICF) experiments. During both the acceleration and deceleration phases of the implosion, the RT instability grows and mixes materials at the interfaces. Mitigating the RT instability enables ICF implosions to achieve hot spot pressures necessary to reach ignition conditions with respect to the Lawson criterion. The current approach is to reduce seeds and match Atwood numbers to reduce instability growth. An alternate approach would be the application of magnetic fields. Here we present computational design efforts using radiation-hydrodynamic codes with magnetohydrodynamic capabilities (FLASH) to study RT inhibition under the influence of magnetic fields on a cylindrical imploding target. Since ablative stabilization has the strongest impact on the inhibition of RT, the key design challenge for cylindrical experiments is achieving relevant temperatures in the fill material. We explore ideas for validation experiments.

[1]The software used in this work was developed in part by the DOE NNSA ASC- and DOE Office of Science ASCR-supported Flash Center for Computational Science at the University of Chicago.

Nomita Vazirani
Los Alamos National Lab

Date submitted: 28 Jun 2019 Electronic form version 1.4