Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Shock formation in Ne, Ar, Kr, and Xe on DD gas puff implosions[1] J. NARKIS, University of California, San Diego, H. U. RAHMAN, F. J. WESSEL, P. NEY, Magneto-Inertial Fusion Technologies, Inc., F. BEG, University of California, San Diego — 1- and 2-D simulations of a 1-cm radius, gas-puff implosion of Ne, Ar, Kr, and Xe liners onto a DD target are conducted using the discharge parameters for the Univ. Nevada, Reno, Zebra (1 MA, 125 ns) voltage driver and the resistive MHD code MACH2. During the run-in phase, initialshock heating preheats the DD plasma, with subsequent stable, adiabatic compression heating the target to high energy density. The dynamics of the former in both the liner and target are investigated. It is shown that magnetic field transport to the liner/target interface does not occur prior to the run-in phase in Ne and Ar liners, yet does occur in Kr and Xe liners, and that magnetic field transport to the interface is a requirement for shock initiation, thus demonstrating the necessity for using a high-Z material in the Staged Z-pinch. Shock reflection off the axis and subsequent collision with the interface results in partial transmission into the liner, which manifests as current reversal, and consequently an enhanced B_θ gradient. 2-D simulations show that magneto-Rayleigh-Taylor instability growth decreases with increasing Z, with shock formation providing sufficient isolation to reproduce the current reversal and enhanced B_θ gradient observed in 1-D simulations.

[1]Advanced Research Projects Agency - Energy, DE-AR0000569

Frank Wessel
Magneto-Inertial Fusion Technologies, Inc.

Date submitted: 15 Jul 2016 Electronic form version 1.4