Abstract Submitted
for the APR08 Meeting of
The American Physical Society

Accessing the High Energy Density Regime using Plasma Jets[1]
JASON CASSIBRY, SETH THOMPSON, UAHuntsville — Plasma jets driven magnetoinertial fusion (PJMIF) is an emerging fusion energy concept which consists of an imploding liner which shock heats and compresses a magnetized target. The liner is formed by the merging of a cylindrical or spherical distribution of plasma jets, which are launched by a salvo of plasma accelerators. Confinement of the target is inertial, with the thermal conduction suppressed by the presence of the magnetic field. PJMIF is now being considered by the DOE as a path towards creating high energy density physics (HEDP) in the laboratory. In this paper, we will use analytical and smoothed particle hydrodynamic (SPH) modeling to show how the HEDP regime is accessible by converging shock waves. The primary goal is to estimate the initial conditions required for plasma liners in reaching 1 Mbar pressure using imploding shocks. Our analytical models consist of the Noh test case and of a self-similar converging shock model in which radially imploding plasma shock heats and compresses a low density core to high pressures. Both models allow calculation of conditions behind a reflected shock in cylindrical or spherical symmetry. We will use SPH to study carefully selected 2D and 3D cases based on the analytical study.

[1]This material is based upon work supported by the Department of Energy EPSCoR program under contract DE-FG02-06ER46268

Jason Cassibry
UAHuntsville

Date submitted: 07 Jan 2008 Electronic form version 1.4