Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Validation of an ablation model for simulating wire array z-pinches[1] R.W. LEMKE, E.M. WAISMAN, E.P. YU, D.B. SINARS, T.A. HAILL, T.A. BRUNNER, H.L. HANSHAW, M.E. CUNEO, M.P. DESJARLAIS, T.A. MEHLHORN, Sandia National Laboratories — We have developed a 3D computational model of cylindrical wire array z-pinches. In lieu of simulating individual wires, we have incorporated a steady state model of wire ablation physics [E. P. Yu, B. V. Oliver, P. V. Sasorov et al., Phys. Plasmas 14, 022705 (2007)] into our 3D, radiation MHD code ALEGRA. We present results of a validation study using radiation pulses, currents, and density profiles from experiments with single wire arrays on the Z accelerator. By tuning the ablation rate in 2D and 3D simulations of arrays with different masses, radiation pulses are produced that are within the measurement uncertainty, which indicates how the mass ablation rate scales with wire radius. Azimuthal current paths in 3D simulations of a 60 degree periodic wedge lead to mass and current distributions that are significantly different than in 2D, and are more consistent with observations.

[1]Sandia National Laboratories is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the US Department of Energy under Contract No. DE-ACO4-94AL85000.

Ray Lemke
Sandia National Laboratories

Date submitted: 19 Jul 2007 Electronic form version 1.4