Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Two-Dimensional Radiation MHD Modeling of Gas Puff Z-Pinch Implosions[1] J.W. THORNHILL, J.L. GIULIANI, Y.K. CHONG, J. DAVIS, A. DASGUPTA, Plasma Physics Division, Naval Research Laboratory, R.W. CLARK, K.G. WHITNEY, Berkeley Scholars, Inc., C. DEENEY, DOE/NNSA — A 2D radiation MHD model was recently developed to investigate large diameter nozzle argon Z-pinch experiments performed on the Decade Quad and Z generators.[2] This model incorporates into the Mach2 MHD code a self-consistent calculation for non-LTE kinetics and ray trace based radiation transport. Such a method is necessary in order to model opacity effects and the high temperature state of these K-shell emitting plasmas. Here, the model is used to demonstrate that increasing the spatial resolution produces significantly better agreement between calculated and experimental current profiles, implosion times, and K-shell radiative powers than attained previously. The resolution is increased by employing a moving rectilinear grid for which each radial grid line moves with the axially averaged radial Lagrangian velocity. The 2D results are processed to generate axially and temporally resolved spectra. By comparing them with experimental spectra, one can assess the capability of a 2D code to accurately model the multi-dimensional Z-pinch dynamics.

[1]Work supported by DOE/NNSA.
[2]J.W. Thornhill, et. al. Phys. of Plasmas **14**, 063301 (2007).

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Date submitted: 22 Jul 2007 Electronic form version 1.4