STAGNATION DYNAMICS OF A Ne GAS PUFF Z PINCH*

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Detailed spatially resolved spectroscopic analysis of a neon gas puff z pinch on the Weizmann 1 MA generator indicates that the radius of the K-shell emitting region grows to a maximum and then decreases during the radiation pulse[1,2]. 1D Lagrangian simulations show the opposite trend because the emission arises from the inside surface of a dense shell that bounces off a hot, stripped central core. We will use a new 2D R-Z MHD simulation code to investigate two scenarios that might explain the observed radial variation. The first involves radial inflow with shock accretion onto a stationary core. The second picture is a dense, decelerating shell subject to the Bell-Plesset instability. In addition to the K-shell radius, the K-shell satellite emission lines also indicate large ion kinetic motion but slow equilibration with the electron temperature. The simulations are challenged to explain this behavior in conjunction with the dynamic configurations. The new 2D code differs from 1D (DZAPP) and 2D (MACH2) Lagrangian approaches in that high-order, shock capturing Godunov algorithms are used instead of artificial viscosity. The population kinetics model for neon is non-LTE and the radiation transport is performed in 3D with long characteristics using a recently verified approach[3].

1. E. Kroupp, et al., PRL, 98, 115001 (2007).
2. D. Osin, Ph.D. Thesis (2008).
3. J. Apruzese and J. Giuliani, J. Quantitative Spectrosc. Rad. Transf. vol.111, p.134 (2010)

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