Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Modeling of the Magnetic Field Entrained in Precursor Plasma of a Fast Cylindrical Shell Implosion on Z MATTHEW MARTIN, RYAN MCBRIDE, Sandia National Laboratories, JOHN GREENLY, Cornell University — Recent experiments on the Z machine at Sandia National Laboratories have demonstrated the measurement of magnetic fields inside an imploding cylindrical liner. The aspect ratio six beryllium liner had a two micron thick aluminum radiographic tracer layer on its inner surface and was driven with approximately 20MA of current over a 100ns rise time. B-dot probes were placed at varying radial positions inside the liner and a time-dependent magnetic field was measured. We compare the results of these experiments to simulations performed with the multi-physics ALEGRA code. These simulations suggest that the measured magnetic field is due to flux frozen into the release from the liner's inner surface. In short pulse mode, the surface magnetic pressure drives a shock into the liner. This shock has a magnetic component which is then frozen into the release wave formed when the shock reaches the liner's free inner surface. Simulations suggest this magnetized low density release then flows past the B-dot probe and is the source of the measured magnetic field. We demonstrate how these experimental measurements could be utilized to infer the amount of magnetic field at the shock front just before it releases into the vacuum. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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Date submitted: 13 Jul 2012 Electronic form version 1.4