VISAR Unfold Analysis of Load Current in MagLIF Experiments

MARK HESS, RYAN MCBRIDE, MATTHEW MARTIN, Sandia National Laboratories — An accurate prediction of the load current is essential in the performance of MagLIF [1] experiments on the Z-Machine at Sandia. At present, the most accurate diagnostic for measuring load current on the Z-machine is the well-established VISAR technique. The VISAR diagnostic measures the velocity of a thin aluminum foil placed near the load, which is subject to the magnetic pressure produced by the load current, using a laser interferometer. The load current unfold analysis is highly nonlinear due to the equation of state/conductivity models, along with the MHD equations governing the foil. Nevertheless, an accurate load current unfold from the VISAR measurement is possible using an MHD code, in conjunction with an optimization algorithm. We will review the VISAR unfold analysis, and show recent current unfolds of MagLIF experiments in comparison to load current measurements using B-dot probes. 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.

[1] S.A. Slutz et al, Phys. Plasmas 17, 056303 (2010).

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