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3D HYDRA Simulations of High Performance MagLIF Experiments[1] M. R. WEIS, M. R. GOMEZ, D. AMPLEFORD, M. GEISSEL, M. E. GLINSKY, A. J. HARVEY-THOMPSON, C. A. JENNINGS, D. LAMPPA, M. MANGAN, K. J. PETERSON, G. A. ROCHAU, D. B. SINARS, S. A. SLUTZ, I. C. SMITH, C. S. SPEAS, D. YAGER-ELORRIAGA, E. P. YU, Sandia National Laboratories, J. M. KONING, M. M. MARINAK, Lawrence Livermore National Laboratory — Post-shot 3D HYDRA simulations of high performing MagLIF experiments have been performed. The simulations incorporate the measured axial magnetic field strength, VISAR unfolded load current, and laser energy and spot profile. Stagnation quantities are generally in good agreement with experimental measurements, including the DD neutron yield, ion temperature, Bz*r_stag, and liner rho*r. The simulated convergence ratio and burn averaged pressure are higher. Additional simulations with larger initial perturbations indicate the discrepancy results from the amount of magneto-Rayleigh-Taylor instability (MRTI) that develops. Simulations forced to run with very little MRTI also show that the laser deposition alone produces axial and azimuthal non-uniformity in the stagnation structure. The azimuthal asymmetry is found to be a result of non-uniform laser deposition and subsequent vorticity amplification during compression. Axial structure results from the laser driven pressure gradients combined with end loss flows. Higher frequency features in the stagnation are tied to MRTI and cause premature loss of thermal insulation.

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