ePLAS MODEL SIMULATIONS OF SHORT PULSE LASER TARGET INTERACTION EXPERIMENTS

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We present recent calculations from ePLAS[1], an implicit/hybrid simulation model applied to targets used in recent UCSD/GA experiments on Rochester's short-pulse laser. The targets are ~1 mm long cone-headed wires of gold and copper, designed to provide data on absorption and transport of hot electrons appropriate to Fast Ignition. The code tracks light to the critical surface in laser targets, generating hot electrons. The peak intensity is ~5x10^{18} W/cm^2, delivered in a pulse of 10-11 picoseconds duration. The energy of the hot electrons is high enough for them to penetrate the gold cone and to propagate both outside and inside the target in a predominantly axial direction. The combination of hot electron propagation and cold electron return flow leads to net surface currents, and O(10 MG) surface magnetic fields. Simulations have been made in both cylindrical and Cartesian geometries to identify geometry dependent effects, and for comparison with the experiments. Results will be reported for dynamic ionization of the initially cold, metallic targets using both tabular and analytic EOS code additions. We will bench-mark K-alpha radiation diagnostics by comparison with simulation results from an ePLAS postprocessor.

1. R. J. Mason and C. Cranfill, “Hybrid Two- dimensional Monte-Carlo electron Transport in Self-consistent Electromagnetic Fields,” IEEE Trans. Plasma Sci. **PS-14**, 45, (1986).

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