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Effects of Self-Generated Magnetic Fields in Rayleigh–Taylor Unstable Laser-Irradiated Plastic Foils I.V. IGUMENSHCHEV, Laboratory for Laser Energetics, U. of Rochester — Self-generated magnetic fields during the nonlinear Rayleigh–Taylor (RT) growth in laser-driven plastic foils are studied using 2-D magnetohydrodynamic simulations. The simulations show that at intensities of $\sim 6 \times 10^{14}$ W/cm^2, the dynamics of the fields sourced by the Biermann battery effect ($\sim \nabla T_\mathrm{e} \times \nabla n_\mathrm{e}$) are strongly affected by the Nernst convection, which compresses the fields toward the ablation surface. As a result, the fields are localized in areas of high resistivity and related magnetic dissipations limit the field growth, determining the magnitude of the fields. The fields saturate at about 2 to 3 MG for perturbation wavelengths $L > 100$ μm and at less than 0.1 MG for $L < 10$ μm because of increased magnetic dissipations at small spatial scales. Self-generated fields can moderately affect the nonlinear RT growth by redistributing heat fluxes for perturbations with $L > 100$ μm. The simulations show good agreement with measurements of magnetic fields in recent direct-drive planar experiments on the OMEGA EP laser.[1] This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

[1]L. Gao *et al.*, Phys. Rev. Lett. **109**, 115001 (2012).

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