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Three-dimensional simulations of Richtmyer-Meshkov experiments

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We measure the growth of Richtmyer-Meshkov instabilities in a convergent plasma (Lanier et al., 2003). Experiments are conducted at the Omega laser facility using cylindrical targets consisting of a low-density foam core and an aluminum marker layer within an epoxy ablator. The targets are directly driven by fifty laser beams and radiographed along the axis. The outer surface of the aluminum layer is machined in order to examine different perturbation spectra. Experiments and simulations study unperturbed (smooth), single-mode, multi-mode (rough), and multi-mode with particular modes accentuated (specified-rough) surfaces. The experimental results vary for rough and specified-rough targets. The rough targets show no marker layer growth beyond that of the smooth targets; whereas, the specified-rough targets (and the single-mode targets) show additional marker growth. Two-dimensional simulations using the RAGE code predict additional marker growth for all perturbed targets and do not explain the lack of observed growth for rough surfaces. We have expanded our simulation efforts to include three-dimensional simulations. At issue is whether the two-dimensional contributions to the specified-rough spectra lead to an enhanced growth of large scale features not generated by the rough spectra. In this paper we present our latest results contrasting the two-dimensional and three-dimensional simulations.

References

Lanier, N.E, Barnes, C.W, Batha, S.H., Day, R.D., Magelssen, G.R., Scott, J.M, Dunne, A.M., Parker, K.W. & Rothman, S.D. 2003 Multi-mode Seeded Richtmyer-Meshkov Mixing in a Convergent, Compressible, Miscible Plasma System, *Physics of Plasmas* **10**, 1816