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Rayleigh–Taylor Growth Measurements of 3-D Modulations in Nonlinear Regime

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The nonlinear growth of 3-D broadband nonuniformities was measured near saturation levels[1,2] using x-ray radiography in planar foils accelerated by the OMEGA laser. An understanding of the nonlinear evolution of the Rayleigh–Taylor instability is essential in inertial confinement fusion and astrophysics. The initial target modulations were seeded by laser nonuniformities and subsequently amplified by the Rayleigh–Taylor instability. The nonlinear saturation velocities are measured in Fourier space and are found to be in excellent agreement with Haan predictions.[3] The measured growth of long-wavelength modes is in good agreement with models of enhanced, nonlinear, long-wavelength generation in ablatively-driven targets.[3] In a real space analysis, bubble merger is quantified by the evolution of distributions of the bubble size, amplitude, and velocity. A self-similar evolution of the distribution of bubble sizes is measured and the bubble-merging rate inferred. This talk will describe the nonlinear evolution of the 3-D modulations and compare them with theoretical models. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC52-92SF19460. Contributors: J. A. Delettrez, D. D. Meyerhofer, S. P. Regan, and T. C. Sangster; O. Sadot (also Ben Gurion University); D. Shvarts, Negev, Israel.

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