Abstract Submitted
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Imaging of Hydrodynamic Perturbation Evolution in a Laser-Driven Foil with a Rippled Rear Surface Using a Fresnel Phase Zone Plate[1] PHILIP NILSON, FREDERIC MARSHALL, JOHN RUBY, JOSH KENDRICK, DALE GUY, STEVEN IVANCIC, CHRISTIAN STOECKL, TIM COLLINS, REUBEN EPSTEIN, Laboratory for Laser Energetics, University of Rochester — Two-dimensional x-ray radiography is used to measure hydrodynamic perturbation evolution in a laser-driven foil with a rippled rear surface. The ablatively driven system was generated on the OMEGA laser with up to few-nanosecond-duration laser pulses at focused intensities above 10^{14} W/cm^2. The modulated rear-surface dynamics were imaged following the passage of a strong, unsupported shock wave. Radiographs were obtained using a 4.75-keV Ti or 6.70-keV Fe He-like resonance line area backlighting source coupled to a Fresnel phase zone plate imager and an SI-800 x-ray charge-coupled device. Static resolution grid tests confirm the achievement of sub-2-μm spatial resolution. The hydrodynamic evolution of planar targets with initial rear surface perturbations of varying wavelength, with and without mid-Z dopants or a high-Z rear-surface coating, are studied and compared with synthetic x-ray radiographs generated from numerical simulations using the computer codes DRACO and Spect3D.

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