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Instability Growth in Cylindrical Implosions at Convergence Ratio 5[1] JOSHUA SAUPPE, SASIKUMAR PALANIYAPPAN, BENJAMIN TOBIAS, KIRK FLIPPO, JOHN KLINE, REBECCA ROYCROFT, PAUL BRADLEY, STEVEN BATHA, KRISTA STALSBERG, Los Alamos National Laboratory, WILLIAM GAMMEL, University of Arizona, OTTO LANDEN, Lawrence Livermore National Laboratory, DOV SHVARTS, Ben-Gurion University of the Negev — Hydrodynamic instability growth is a key factor limiting performance in inertial confinement fusion implosions, and growth is further enhanced in convergent geometry due to Bell-Plesset effects. Direct measurements in spherical systems are challenging, but cylindrical systems include the effects of convergence while retaining diagnostic access to the unstable interface. We present results from laser-driven cylindrical implosions at convergence ratio CR=5 (CR=initial radius/final radius), the highest yet achieved in these experiments, for three different sizes of target. Hydrodynamic growth of an initial perturbation occurs through a mix of the buoyancy-driven Rayleigh-Taylor instability during the deceleration phase and Bell-Plesset effects, and analytic models are employed to identify key differences in these targets and previous experiments at lower CR. The experimental results compare favorably with radiation-hydrodynamics modeling. Designs that push to higher CR through the use of gas-filled cylinders are presented.

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