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**Hydrodynamic Instability Growth in Polar-Direct-Drive Implosions at the National Ignition Facility** M. HOHENBERGER, A. SHVYDKY, P.B. RADHA, M.J. ROSENBERG, V.N. GONCHAROV, F.J. MARSHALL, J.P. KNAUER, S.P. REGAN, T.C. SANGSTER, Laboratory for Laser Energetics, U. of Rochester, A. NIKROO, R.J. WALLACE, LLNL — Polar direct drive (PDD) is an alternative, direct-drive inertial confinement fusion platform being developed at the National Ignition Facility (NIF). Shell stability of the target is of key importance for an optimized performance. We have begun an experimental campaign to characterize Rayleigh–Taylor (RT) growth and laser imprint in spherical PDD implosions on the NIF. Plastic, cone-in-shell targets with an outer diameter of $\sim 2.2$ mm were imploded, and the RT-amplified shell mass modulations were tracked via measurements of the 2-D optical depth variations using soft x-ray radiography. The RT growth of discrete modes was investigated by machining single-mode, sinusoidal corrugations onto the target surface, which acted as well-characterized seeds. We will present platform characterization and backlighter optimization data as well as experimental results of instability growth in spherical PDD experiments on the NIF. The experimental data will be compared to 2-D *DRACO* simulations and strategies for measuring high $\ell$-mode perturbations $> 300$ and for mitigating imprint in future PDD experiments will be discussed. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

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