Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Hydrodynamic Scaling of the Deceleration-Phase Rayleigh–Taylor Instability A. BOSE, R. NORA, K. WOO, R. BETTI, Laboratory for Laser Energetics and Fusion Science Center, U. of Rochester — A 2-D study of the deceleration-phase Rayleigh–Taylor (RT) growth is carried out to assess how the yield-over-clean (YOC) varies in hydro-equivalent implosions. Hydro-equivalent implosions exhibit equal implosion velocity, adiabat, and laser intensity. The YOC indicates the effects of hydrodynamic instabilities on inertial fusion capsule implosions. While the classical RT instability follows the laws of hydrodynamic similarity (the same growth factor for hydro-equivalent implosions), the effects of ablation and thermal transport in the hot spot cause a deviation from similarity. We present analytic and numerical calculations of the RT growth factors in hydro-equivalent implosions with target sizes varying from typical OMEGA to NIF-scale targets. Theoretical scaling suggests that the deceleration-phase Atwood number and ablation velocity is different for OMEGA and the NIF, yielding growth factors that are dependent on the target size. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944 and DE-FC02-04ER54789 (Fusion Science Center).

A. Bose
Laboratory for Laser Energetics and Fusion Science Center, U. of Rochester

Date submitted: 11 Jul 2013 Electronic form version 1.4