Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

One-Dimensional Hydrodynamic Theory of Shock Ignition R. NORA, R. BETTI, Laboratory for Laser Energetics and Fusion Science Center, U. of Rochester — This work investigates the theoretical foundations of shock-ignition hydrodynamics. A simple analytical model is used to determine the maximum hot-spot pressure theoretically achievable for an inertial confinement fusion implosion with a given input energy. The analysis is carried out for a simple slab model of a planar foil (the shell) compressing a low-density plasma (the hot spot). In such a model, the compression is driven by reflected shocks and the decompression is produced by rarefaction waves. It is shown that capsule implosions may approach the theoretical maximum by applying a series of weak shocks to prevent the generation of rarefaction waves in the shell caused by multiple shell-shock interactions during the deceleration phase. These results are then applied to understand and optimize hot-spot performance in shock-ignition implosions. Various capsule dimensions, implosions velocities, and shock strengths are studied in maximizing the peak hot-spot pressure. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement Nos. DE-FC52-08NA28302 and DE-FC02-04ER54789.

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Date submitted: 13 Jul 2010 Electronic form version 1.4