Abstract Submitted
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Numerical simulation of exploding pusher targets[1] S. ATZENI, Dip. SBAI, Universita' di Roma "La Sapienza", M. J. ROSENBERG, LLE, Univ. Rochester, M. GATU JOHNSON, R. D. PETRASSO, PSFC, MIT — Exploding pusher targets, i.e. gas-filled large aspect-ratio glass or plastic shells, driven by a strong laser-generated shock, are widely used as pulsed sources of neutrons and fast charged particles. Recent experiments on exploding pushers provided evidence for the transition from a purely fluid behavior to a kinetic one [1]. Indeed, fluid models largely overpredict yield and temperature as the Knudsen number Kn (ratio of ion mean-free path to compressed gas radius) is comparable or larger than one. At Kn = 0.3 - 1, fluid codes reasonably estimate integral quantities as yield and neutron-averaged temperatures, but do not reproduce burn radii, burn profiles and DD/DHe3 yield ratio. This motivated a detailed simulation study of intermediate-Kn exploding pushers. We will show how simulation results depend on models for laser-interaction, electron conductivity (flux-limited local vs nonlocal), viscosity (physical vs artificial), and ion mixing. [1] M. J. Rosenberg et al., Phys. Rev. Lett. 112, 014022 (2014); Phys. Plasmas 22, 062702 (2015).

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