Thu1.1 Wilson et al.

Mixing in thick-walled and pulse-shaped directly driven ICF capsule implosions.

D.C. Wilson[1], F.J. Marshall[2], P.W. McKenty[2], V.Yu. Glebov[2], C. Stoeckl[2], C.K. Li[3], F.H. Séguin[3], D.G. Hicks[3], R.D. Petrasso[3], C.W. Cranfill[1], G.D. Pollak[1] & W.J. Powers[1]

1. Los Alamos National Laboratory
Los Alamos, New Mexico, USA
dcw@lanl.gov

2. Laboratory for Laser Energetics,
U. of Rochester, USA

3. Plasma Science and Fusion Center,
Massachusetts Institute of Technology, USA

The mult-fluid interpenetration mix model of Scannapieco and Cheng (Phys. Lett A, 2002) has been applied to X-ray driven inertial confinement fusion capsules (ICF) (Wilson *et al*., Phys. Plamas, 2003), to double shell ICF capsules (Wilson *et al*. 2004a), and to directly driven capsules with a 20 μm wall thickness using a 1ns square laser pulse with both symmetric (Wilson *et al*., 2004b) and asymmetric illumination (Christensen *et al*., 2004). In general it was found that using atomic mixing the single mixing parameter could fit almost all the data with a value of 0.05 ±0.02. In this paper the model is tested against data from a wider range of directly driven capsules with wall thicknesses up to 40 μm, and with square, moderate (PS26) and extreme (low adiabat) pulse shapes (Marshall *et al*., 2000a,b, 2004). In addition to yield, burn temperature, and burn history, model simulations are post-processed to compare with X-ray image profiles, secondary neutron yields, and shell rho-r measurements.

References

Christensen, C. R. et al. 2004, The influence of asymmetry on mix in direct-drive ICF experiments, accepted for Phys. Plasmas, May, 2004.

Scannapieco, A. J. and Cheng, B. 2002, A multifluid interpenetration mix model; Phys. Lett. A, 299, 49-64.

Marshall, F. J. *et al*. 2000a, Direct-drive, hollow-shell implosion studies on the 60-beam; UV OMEGA laser system; Phys. Plasmas, **7**, 1006-1013.

Marshall, F. J. *et al*. 2000b, Direct-drive high-convergence-ratio implosion studies on the OMEGA laser system; Phys. Plasmas, **7**, 2108-2113.

Marshall, F. J. *et al.* 2004 Direct-drive-implosion experiments with enhanced fluence balance on OMEGA; Phys. Plasmas, **11**, 251-259.

Wilson, D. C. et al. 2003, Degradation of radiatively driven inertial confinement fusion capsule implosions by multi-fluid interpenetration mixing, Phys. Plasmas 10, 4427-4434.

Wilson, D. C. et al. 2004a, Mixing in double shell capsules, proceedings of IFSA 2003, to be published by the American Nuclear Society.

Wilson, D. C. et al. 2004b. Multi-fluid interpenetration mixing in directly driven inertial confinement fusion capsule implosions, accepted for Phys. Plasmas, May, 2004.