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Kinetic simulation of hydrodynamic equivalent capsule implosions[1] THOMAS KWAN, ARI LE, MARK SCHMITT, HANS HERRMANN, Los Alamos Natl Lab — We have carried out simulations of direct-drive hydrodynamic equivalent capsule implosion experiments conducted on Omega laser facility at the Laboratory of Laser Energetics of the University of Rochester. The capsules had a glass shell (SiO_2) 4.87μm with an inner diameter of 1086μm. One was filled with deuterium (D) and tritium (T) at 6.635 and 2.475 atmospheric pressure respectively. The other capsule with D, T, and He-3 at 2.475, 2.475, and 5.55 atmospheric pressure respectively. The capsules were imploded with 60 laser beams with a square pulse length of 0.6ns of total energy of 15.6 kJ. One-dimensional radiation hydrodynamic calculations with HYDRA and kinetic particle/hybrid simulations with LSP are carried out for the post-shot analysis. HYDRA outputs at 0.6ns are linked to LSP, in which the electrons are treated as a fluid while all the ion dynamics is simulated by the standard particle-in-cell technique. Additionally, simulations with the new photon package in LSP are initiated at the beginning of the implosion to include the implosion phase of the capsule. The simulation results of density, temperature, and velocity profiles of the electrons, D, T, He-3, and SiO_2 species are compared with HYDRA. Detail comparisons among the kinetic simulations, rad-hydro simulations, and experimental results of neutron yield, yield ratio, fusion burn histories, and shell convergence will be presented to assess plasma kinetic effects.

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