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Three-Dimensional Study of Yield Degradation for Direct-Drive Inertial Confinement Fusion K.M. WOO, R. BETTI, R. YAN, H. ALUIE, A. BOSE, D.X. ZHAO, V. GOPALASWAMY, Laboratory for Laser Energetics, U. of Rochester — The mechanism of yield degradation in the deceleration phase for direct-drive inertial confinement fusion was studied using a recently developed three-dimensional radiation–hydrodynamics code *DEC3D*. Under the approximation of adiabatic hot spot, an expression that measures the degradation of neutron rate was obtained in terms of the ratio of perturbed to the clean hot-spot volume. The characteristics of perturbed hot-spot volume is identified as a key parameter to understand the departure from spherical symmetry. The role of 3-D effects on compressibility, which affects the hot-spot volume, was examined including the 3-D vorticity dynamics in the spherical converging geometry and the jet flow in P-1 perturbations. In particular, the hot spot was found to be less compressible in the nonlinear phase of the Rayleigh–Taylor instability, resulting in a poor hydrodynamic efficiency to convert the shell kinetic energy into hot-spot pressure. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DENA0001944.

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