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Feasibility Study of Measuring In-Flight Shell Thickness for a Laser-Direct-Drive DT Cryogenic Implosion[1] JOSHUA BALTAZAR, R.C. SHAH, S.X. HU, K. CHURNETSKI, R. EPSTEIN, I.V. IGUMENSHCHEV, T. JOSHI, W. THEOBALD, V.N. GONCHAROV, S.P. REGAN, Laboratory for Laser Energetics, University of Rochester — In laser-direct-drive (LDD) inertial confinement fusion (ICF) experiments, the hydrodynamic instabilities seeded by laser imprint and target features (e.g., microscopic surface debris, fill tube or stalk) can increase the in-flight shell thickness (i.e., decompress the shell) during the acceleration phase. Signatures from self-emission X rays versus the ablation front are investigated to diagnose the cryogenic layer, similar to what was done on warm LDD implosions of gas-filled, plastic shell targets [D.T. Michel et al., Phys. Rev. E 95, 051202(R) (2017)]. The feasibility of extending a diagnostic technique to obtain the in-flight shell thickness measurements of an LDD ICF DT cryogenic implosion from the spatial distribution of the X-ray emission will be presented for a range of adiabat, between 2 and 5. The shell trajectories are inferred by comparing the hydrodynamic profiles of the target with self-emission profiles obtained from a radiative transport post-processor, including the instrument response function of the X-ray imager.

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