Hot-spot emission properties in a warm plastic-shell implosion on OMEGA

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A warm plastic-shell implosion was performed on the OMEGA laser system. The measured corona plasma evolution and shell trajectory in the acceleration phase are reasonably simulated by the one-dimensional LILAC simulation including the nonlocal and cross-beam energy transfer models. The results from analytical thin-shell model reproduce the time-dependent shell radius by LILAC simulation, and also the hot-spot x-ray emissivity profile at stagnation predicted by Spect3D. In the Spect3D simulations within a clean implosion, a "U"-shaped hot-spot radius evolution can be observed with the Kirkpatrick-Baez microscope response (the photon energy is from 4 to 8 keV). However, a fading away hot-spot radius evolution was measured in OMEGA warm plastic-shell implosion because of mixings. The distance from the measured hot-spot radius evolution shape to the "U" shape could be a new criterion for an experimental implosion performance. To recover the measured hot-spot x-ray emissivity profile at stagnation, a non-isobaric hot-spot model is built, and the normalized hot-spot temperature, density, and pressure profiles (normalized to the corresponding target-center values) are obtained.

References:

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