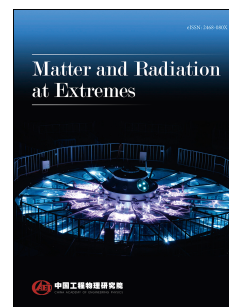


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Effects of mode coupling between low-mode radiation flux asymmetry and intermediate-mode ablator roughness on ignition capsule implosions

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The low-mode shell asymmetry and high-mode hot spot mixing appear to be the main reasons for the performance degradation of the National Ignition Facility (NIF) implosion experiments. The effects of the mode coupling between the low-mode P2 radiation flux asymmetry and intermediate-mode $L = 24$ capsule roughness on the implosion performance of ignition capsule are investigated by two-dimensional radiation hydrodynamic simulations. It is shown that the amplitudes of new modes generated by the mode coupling are in good agreement with the second-order mode coupling equation during the acceleration phase. The later flow field not only shows large areal density P2 asymmetry in the main fuel, but also generates large-amplitude spikes and bubbles. In the deceleration phase, the increasing mode coupling generates more new modes, and the perturbation spectrum on the hot spot boundary is mainly from the strong mode interactions rather than the initial perturbation conditions. The combination of the low-mode and high-mode perturbations breaks up the capsule shell, resulting in a significant reduction of the hot spot temperature and implosion performance.

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