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Numerical study on magneto-Rayleigh-Taylor instabilities for thin liner implosions on the PTS facility

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The thin aluminum liners with an aspect ratio R/Dr » 1 have been imploded on the primary test stand (PTS) facility, where R is the outer radius of the liner and Dr is the thickness. The x-ray self-emission images present azimuthally correlated perturbations in the liner implosions. The experiments show that at −10 ns before the stagnation, the wavelengths of perturbation are about 0.93 mm and 1.67 mm for the small-radius and large-radius liners, respectively. We have utilized the resistive magnetohydrodynamic code PLUTO to study the development of magneto-Rayleigh–Taylor (MRT) instabilities under the experimental conditions. The calculated perturbation amplitudes are consistent with the experimental observation very well. We have found that both mode coupling and long implosion distance are responsible for the more developed instabilities in the large-radius liner implosions.

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