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Radiative stabilization of the shock-driven interfacial instabilities in double-shell targets

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Double-shell targets, as an additional design for demonstrating and exploring ignition, consist of two concentric shells, a low-Z outer-shell (ablator) surrounding a high-Z inner-shell (pusher) kept in place by a low-density foam. The hydrodynamic instabilities such as Rayleigh-Taylor (RT) and Richtmyer-Meshkov (RM) are especially critical due to the existence of several interfaces, such as the pusher/foam interface with a high Atwood number. In the talk, we will discuss the hyrdodynamic stabilization of the pusher/foam and foam/ablator interfaces due to the radiative shock in the foam layer. When the ablatively-driven shock by the laser or radiation enters the low-density foam layer (tens of mg/cc) from the outer shell, the shock may become radiating as the radiative flux plays a role in the dynamics to stabilize the pusher/foam and foam/ablator interfaces. The preheat of the radiative shock promotes the outer and inner shells expanding towards the foam layer, and the move of the interface renders the effective reduction of the Atwood number at the interfaces, resulting in the hydrodynamic stabilization. 2D simulation by the radiation hydrodynamic codes is also performed to verify the stabilization due to the radiative shock for the double-shell targets.

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