

P1.2001 Self-Similar Multimode Evolution of the Ablative Rayleigh-Taylor Instability and Its Application in Inertial Confinement Fusion

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See the full abstract here:

<http://ocs.ciemat.es/EPS2019ABS/pdf/P1.2001.pdf>

The self-similar nonlinear evolution of the multimode ablative Rayleigh-Taylor instability (RTI) is studied numerically. It is shown that the nonlinear multimode bubble-front penetration follows the gt^2 scaling law with dependent on the initial conditions and ablation velocity. It is shown that mass ablation reduces with respect to its classical value for the same initial perturbation amplitude. The value of can be described by the bubble competition theory and is not significantly affected by the vorticity acceleration of the bubble-front velocity. It is also shown that ablation effect prevents the transition of the RTI from the bubble competition to the bubble-merger regime at large initial amplitudes, leading to higher values of than in the classical case. The bubble competition theory of the ablative RTI is further applied to access the hydrodynamic stability boundary and compared with the experimental observations in laser direct-drive implosion experiments. It is indicated that the experimental hydrodynamic stability boundary could be caused by the nonlinear ablative RTI in the acceleration phase of the implosion.

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