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Scale-coupling and Nonlinear Dynamics in Compressible Rayleigh-Taylor Instability DONGXIAO ZHAO, Department of Mechanical Engineering, University of Rochester, HUSSEIN ALUIE, 1. Laboratory for Laser Energetics, University of Rochester 2.Department of Mechanical Engineering, University of Rochester, RICCARDO BETTI, 1. Laboratory for Laser Energetics, University of Rochester 2.Department of Mechanical Engineering & Physics and Astronomy, University of Rochester — The Rayleigh-Taylor instability (RTI) is a ubiquitous instability occurring in laser-accelerated targets and in many geophysical and astrophysical environments. Mass ablation or evaporation can significantly alter the RTI evolution in laser-driven plasmas as well as in molecular clouds and supernovae ejecta. We perform single and multimode simulations of 3D compressible RTI using a hybrid pseudospectral-compact finite difference scheme. We will present preliminary results on how different length scales are dynamically coupled at various stages of the instability, especially in the highly nonlinear regime. Our goal is to understand how ablation alters this scale-coupling and its effect on the overall growth of the mixed layer, which may have significant ramifications to modeling efforts in implosion physics.

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