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Numerical simulations of Rayleigh-Taylor (RT) turbulence with complex acceleration history PRAVEEN RAMAPRABHU, University of North Carolina at Charlotte, GUY DIMONTE, MALCOLM ANDREWS, Los Alamos National Laboratory, LANL/UNCC COLLABORATION — Complex acceleration histories of an RT unstable interface are important in validating turbulent mix models. Of particular interest are alternating stages of acceleration and deceleration, since the the associated demixing is a discriminating test of such models. We have performed numerical simulations of a turbulent RT mixing layer subjected to two stages of acceleration separated by a stage of deceleration. The profile was chosen from earlier Linear Electric Motor experiments with which we compare our results. The acceleration phases produce classical RT unstable growth (t^2) with growth rates comparable to earlier results of turbulent RT simulations. The calculations are challenging as dominant bubbles become shredded as they reverse direction in response to the reversal in g, placing increased demands on numerical resolution. The shredding to small scales is accompanied by a peaking of the molecular mixing during the RT stable stage. In general, we find that simulations agree with experiments when initialized with broadband initial perturbations, but not for an annular shell. Other effects such as the presence of surface tension in the LEM experiments (but not in our simulations) further complicate this picture.

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