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Evolution of the density self-correlation in developing RM turbulence CHRISTOPHER TOMKINS, B.J. BALAKUMAR, G. ORLICZ, K. PRESTRIDGE, J.R. RISTORCELLI, Los Alamos National Laboratory — Turbulent mixing in a Richtmyer-Meshkov unstable light-heavy-light (air-SF_6-air) fluid layer subjected to a shock (Mach 1.20) and a reshock (Mach 1.17) is investigated using true ensemble statistics obtained from simultaneous velocity-density measurements. The mixing is found to be driven by an unstable array of initially symmetric vortices that induce rapid material mixing and create smaller scale vortices. The density self-correlation (b) and terms in its evolution equation are directly measured experimentally for the first time after reshock. Amongst other things, it is found that production terms are balanced by the dissipation terms, suggesting a form of equilibrium in b. Simultaneous velocity measurements are used to probe the state of the incipient turbulence. Results suggest that an inertial range is just beginning to form, consistent with the onset of a mixing transition. Second-order structure functions of the density field do not exhibit the classical 2/3 power-law behavior, which is discussed.

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