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**Regularization mechanism of Rayleigh-Taylor turbulent mixing**[1]

SNEZHANA I. ABARZHI, University of Chicago — Turbulent mixing induced by Rayleigh-Taylor instability plays an crucial role in a variety of high energy density phenomena spanning astrophysical to atomistic scales, including inertial confinement fusion, supernovae, and interstellar molecular clouds. We apply group theory to analyze symmetries, invariants, scaling and spectra of turbulent mixing induced by the Rayleigh-Taylor instability. The properties of this unsteady, anisotropic, and inhomogeneous turbulent process are found to depart from the canonical Kolmogorov scenario. Time- and scale-invariance of the rate of momentum loss leads to non-dissipative momentum transfer between the scales, to 1/2 and 3/2 power-law scale-dependencies of the velocity and Reynolds number respectively, and to spectra distinct from Kolmogorov. Turbulent mixing exhibits more order compared to isotropic turbulence and its viscous and dissipation scales are set by the flow acceleration. To trigger relaminarization of RT mixing, few mechanisms are proposed, including coherence of the initial conditions and the flow acceleration with high favorable pressure gradient.

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