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Invariant, scaling and spectral properties of Rayleigh-Taylor turbulent mixing[1] SNEZHANA I. ABARZHI, FLASH Center, The University of Chicago — Turbulent mixing induced by the Rayleigh-Taylor (RT) instability plays a key role in a variety of plasma phenomena, ranging from astrophysical and micro-scales. Based on the new theoretical concept, the rate of momentum loss, we develop a model, which accounts for the highly anisotropic and non-local character of the mixing dynamics and describes the transports of momentum and energy in the turbulent flow. It is shown that invariant, spectral and scaling properties of RT turbulent mixing are substantially different from those in isotropic Kolmogorov turbulence. For instance, the rate of momentum loss is the basic quantity of the turbulent mixing, similarly to the rate of energy dissipation in Kolmogorov turbulence. The velocity scales as square root of length scale and the spectrum of kinetic energy is proportional to k^{-2} in RT flow, compared to the power 1/3 for velocity scale and $k^{-5/3}$ for velocity spectrum in classical turbulence. We discuss the model validation and the diagnostics of the turbulent flow quantities.

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