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Dissipation in non-equilibrium turbulence WOUTER BOS, CNRS - LMFA - Ecole Centrale de Lyon, ROBERT RUBINSTEIN, None — For about a decade, experimental and numerical studies have reported on the existence of an anomalous behaviour of the viscous dissipation rate in unsteady turbulence (see for instance Vassilicos, Annu. Rev. Fluid Mech. 2015). It appears that the short-time transient dynamics can be described by a universal power law, incompatible with Taylor's 1935 dissipation rate estimate. We show that these results can be explained using a non-equilibrium energy distribution, obtained from a low-frequency perturbative expansion of simple spectral closure. The resulting description is fairly simple. In particular, during the transient, according to the predictions, the normalized dissipation rate C_ϵ evolves as a function of the Taylor-scale Reynolds number R_λ following the relation $C_\epsilon \sim R_\lambda^{-15/14}$, in close agreement with experimental and numerical observations.

Wouter Bos
CNRS - LMFA - Ecole Centrale de Lyon

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