Uncovering the intrinsic properties of high-Reynolds number turbulence via One-Dimensional Turbulence (ODT)

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Rare but extreme dissipation events are dynamically important, but their numerical simulation represents a formidable computational challenge given the scale separation of high-Reynolds number turbulence. Here, we explore the potential of a reduced dimensionality model, namely, the One-Dimensional Turbulence (ODT) approach, to represent the small-scale intermittency in forced homogeneous isotropic turbulence (HIT). We compute temporally and spatially resolved simulations of forced HIT at Reynolds numbers up to $Re_\lambda = 5428$ and validated against theoretical and numerical published results. The computational tractability of ODT enables a detailed study of the turbulence that generates these extreme dissipation events.

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