Non-diffusive features of near-critical DTEM-turbulence in the presence of a subdominant diffusive transport channel

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We recently explored the change in properties of turbulent transport, in the context of dissipative-trapped-electron-mode (DTEM) turbulence with evolving mean profiles, as a function of the relative strength of a (subdominant) diffusive transport channel to the turbulent one [1]. We found that if the diffusive channel is totally absent and the system is slowly driven, transport exhibits many features characteristic of self-organized-critical (SOC) systems. This finding is consistent with those reported by several authors in other situations such as pressure-gradient-driven or ion-temperature-gradient turbulence [2]. But we also find that the temporal persistence and spatial self-similarity characteristic of the SOC state remain present, at a level much higher than what one would naively expect, as the strength of the diffusive channel is increased. This observation, may give a partial answer to the question of why SOC features are so frequently observed in turbulent experimental data and numerical simulations in spite of the fact that the experimental conditions appear to be quite far from those required by the strict definition of the self-organized-critical state. In this contribution, we extend this work by investigating the characteristic features of tracer particle transport in the system. By means of several techniques [3-5], we will characterize tracer transport and discuss how its non-diffusive features vary as the level of subdominant diffusivity is increased from zero.

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