Role of polarization and $\mathbf{E} \times \mathbf{B}$ nonlinearities in setting tracer transport features in dissipative-trapped-electron-mode turbulence

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Recently, a nonlocal (quasilinear) renormalization scheme for turbulent transport of passive scalars has been formulated that allows to derive renormalized transport equations for passive scalars in terms of fractional differential operators [1]. As a result, it has provided with yet another method to obtain fractional transport exponents for these problems by characterizing the statistics and correlations of the Lagrangian velocities along the characteristics trajectories of the flow. This method complements other existent ones, such as those based on the calculation of the tracer average propagator [2], and can be specially advantageous in certain situations.

In this contribution, we employ all these methods to characterize tracer transport in simulations of drift-wave turbulence in slab geometry [3] in different situations. The simplified geometry allow us to concentrate on the study of which is the role that the polarization and $\mathbf{E} \times \mathbf{B}$ nonlinearities play in determining the value of the effective fractional transport exponents. We do this by artificially tuning their amplitudes. In addition, several driven and non-driven situations will be explored to test the robustness of the effective fractional exponents as the simulation are forced externally.

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