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Determination of fractional transport exponents in drift-wave turbulence: the Lagrangian method vs the Propagator method D. E. NEWMAN, Univ. of Alaska Fairbanks, RAUL SÁNCHEZ, B.A. CARRERAS, Oak Ridge National Laboratory — Recently, a nonlocal (quasilinear) renormalization scheme for turbulent transport of passive scalars has been formulated that allows one to derive renormalized transport equations for passive scalars in terms of fractional differential operators [1]. This resulted in a new method for obtaining fractional transport exponents for these problems by characterizing the statistics and correlations of the Lagrangian velocities along the characteristics trajectories of the flow. In this contribution, we use this new method to determine the fractional exponents in simulations of drift-wave turbulence in slab geometry [2] and discuss the advantages and disadvantages of the method. Several driven and non-driven situations will be explored, in which the relative dominance of the polarization and $\mathbf{E} \times \mathbf{B}$ nonlinearities will be tuned artificially. In this way, we can test the robustness of the fractional transport models to changes in the basic dynamics, which helps assess the general potential of these methods.

[1] R. Sánchez, et al, Phys.Rev. E (in press, 2006);
[2] D.E. Newman, et al, Phys. Fluids B **5**, 1140 (1993)

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