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Verification of fractional quasilinear renormalization theory using drift-wave turbulence simulations D.E. NEWMAN, Univ. of Alaska Fairbanks, R. SANCHEZ, Universidad Carlos III de Madrid, B.A. CARRERAS, V.E. LYNCH, Fusion Energy Division, ORNL, B.PH. VAN MILLIGEN, EURATOM-CIEMAT —
A very recent renormalization scheme for turbulent transport has been formulated in terms fractional differential operators [1]. In this contribution, we test it against numerous tracer particle transport experiments carried out in simulations of drift-wave turbulence in slab geometry [2]. The simplified geometry allows that simulations be carried out for a sufficiently large number of decorrelation times so that the long-term dynamics captured by these operators can be made apparent. By changing the relative dominance of the polarization and $\mathbf{E} \times \mathbf{B}$ nolinearities artificially, we tune at will the degree of homogeneity and isotropy of the system. Additionally, externally-driven sheared flows can also be considered. This wide spectrum of options creates a superb environment to test the strengths and weaknesses of the fractional renormalization formalism. With it, the potential for application to more realistic geometries such as those in state-of-the-art tokamak turbulence codes will be assessed.

References

[1] R. Sánchez, B.A. Carreras, D.E. Newman, V. Lynch and B.Ph. van Milligen, submitted (2005)

[2] D.E. Newman, P.W. Terry, P.H. Diamond and Y. Liang, Phys. Fluids B **5**, 1140 (1993)

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