DPP08-2008-000044

Abstract for an Invited Paper
for the DPP08 Meeting of
the American Physical Society

**On the nature of transport across sheared zonal flows in electrostatic ion-temperature-gradient turbulence gyrokinetic simulations**[1]

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In this contribution, we argue that the usual picture for the suppression of turbulent transport across a stable sheared flow based on a reduction of diffusive transport coefficients is, by itself, incomplete. By means of gyrokinetic simulations of electrostatic, collisionless ion-temperature-gradient turbulence in toroidal geometry with DIII-D-like parameters using the $\delta$f, PIC gyrokinetic UCAN code, we show that the nature of the radial transport across poloidal and toroidal zonal flows is altered fundamentally, and changes from diffusive to correlated and subdiffusive. In the case in which the zonal flows are self-consistently driven by the turbulence, the radial transport gains an additional non-Gaussian character. The analysis has been done using several techniques imported from the theory of stochastic transport processes. The results obtained suggest that modeling transport across these flows via reduced diffusivities or conductivities may be inadequate. They also point out the need for a reexamination of the current understanding of how the dynamics of transport across sheared flows are set. Some plausible mechanisms to fill in this role will be discussed.

[1]In collaboration with: D.E. Newman, J.N. Leboeuf, B.A. Carreras and V.K. Decyk. Work supported by the LDRD program at ORNL and DOE Office of Science.