Abstract Submitted
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**Minimal models of finite Larmor radius effects on non-diffusive transport in two-dimensional plasmas**[1] KYLE GUSTAFSON, University of Maryland, DIEGO DEL CASTILLO NEGRETE, Oak Ridge National Laboratory, WILLIAM DORLAND, University of Maryland — In order to gain understanding of non-diffusive transport in a simplified regime, we investigate minimal but non-integrable models for chaotic advection based on the Hasegawa-Mima limit of the gyrokinetic equation[2]. These prescribed streamfunction models exhibit Lagrangian turbulence for passive tracer particles in the flow. In particular, particles execute Lévy flights as they drift between vortices and surrounding zonal flows. We give the ensemble of tracers a Maxwellian distribution of gyroradii, which allows us to report on finite Larmor radius (FLR) effects. Measurements of transport for an ensemble of such trajectories shows non-diffusive scaling of the variance, $\sigma^2$, such that $\sigma^2 \sim t^\alpha$, where $1 < \alpha < 2$. We show that the shape and the spatio-temporal scaling of the Lagrangian propagator can be modeled with fractional diffusion equations currently used to study non-local transport in plasmas. [3]. We find, as expected, that a larger average Larmor radius causes more particles to free-stream instead of travel in the stochastic layer. We also report on measures of the velocity correlations for passive particles in the flow, as this may be a useful technique for probing gyrokinetic turbulence.

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[2]del Castillo Negrete, Phys. Fluids 10, 1998
[3]del Castillo Negrete, Phys. Plasmas, 13 082308, 2006

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