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Nondiffusive transport in drift/Rossby waves in zonal flows modeled by a fractional diffusion equation KYLE GUSTAFSON, Department of Physics, University of Maryland, College Park, DIEGO DEL-CASTILLO-NEGRETE, Oak Ridge National Laboratory, Oak Ridge, TN, WILLIAM DORLAND, Department of Physics, University of Maryland, College Park — Nondiffusive transport is a problem of theoretical and practical interest in plasma physics and fluid dynamics in general. Recently, it has been shown that fractional calculus is a natural and powerful tool for describing, within a unified framework, this type of transport in plasma turbulence [1]. Here we explore the use of this formalism to study test-particle transport by drift/Rossby waves in zonal flows, following [2]. The drift/Rossby wave Hamiltonian gives rise to asymmetric Lévy flights and non-Gaussian probability density functions (pdfs) for particle displacements. We further examine the behavior of the transport asymmetry in parameter space. Also, we demonstrate quantitatively that a fractional diffusion equation provides a description of nondiffusive transport in this system. Lastly, we discuss preliminary ideas concerning how a similar approach can be applied to describe complex nondiffusive plasma transport problems, such as self-consistent gyrokinetic-Maxwell systems. [1] D. del-Castillo-Negrete, et al., Phys. Rev. Lett. **94**, 065003 (2005). [2] D. del-Castillo-Negrete. Phys. Fluids **10**, 576 (1998).

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