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Kinetic Versus Fluid Effects in Turbulence: A Study of Distribution Function Dynamics JASON TENBARGE, JAMES JUNO, University of Maryland — Upcoming and proposed spacecraft missions will supply unprecedented particle distribution function data sets; however, our current predictions of the shape of the distribution function in a turbulent bath are mostly informed by simplistic models using quasi-linear theory or simplistic numerical simulations that do not employ a full, strong turbulence cascade. The few existing numerical simulations of turbulence that have focused on distribution functions dynamics have ascribed all observed features to kinetic effects, ignoring the possibility that linear waves alter the distribution and the adiabatic changes that could also occur. Inspired by the Turbulence Dissipation Challenge, we use the novel Gkeyll framework, which contains both a mutli-fluid model and the full Vlasov-Maxwell system, to compare the results of a fluid to a fully kinetic approach to studying simulations of a spectrum of kinetic Alfvén waves and a 2.5D Orszag-Tang vortex. We focus on the particle distribution function dynamics to identify both similarities and differences in the fluid and full kinetic simulations in an attempt to identify what are truly kinetic effects versus potentially adiabatic changes.

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