Discrete particle noise in a nonlinearly saturated plasma[1]
THOMAS JENKINS, W. W. LEE, Princeton Plasma Physics Laboratory — Understanding discrete particle noise in an equilibrium plasma has been an important topic since the early days of particle-in- cell (PIC) simulation [1]. In this paper, particle noise in a nonlinearly saturated system is investigated. We investigate the usefulness of the fluctuation-dissipation theorem (FDT) in a regime where drift instabilities are nonlinearly saturated. We obtain excellent agreement between the simulation results and our theoretical predictions of the noise properties. It is found that discrete particle noise always enhances the particle and thermal transport in the plasma, in agreement with the second law of thermodynamics. [1] C.K. Birdsall and A.B. Langdon, *Plasma Physics via Computer Simulation*, McGraw-Hill, New York (1985).

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