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Finding the crossover from phase mixing to collisions with an integral transform. J. M. HENINGER, P. J. MORRISON, University of Texas at Austin — The one-dimensional linearized Vlasov-Poisson system can be exactly solved using the "G transform" [1], an integral transform based on the Hilbert transform. This transform removes the electric field, leaving a simple advection equation. We investigate how this integral transform interacts with the Fokker-Planck collision operator. The commutator of this collision operator with the G transform (the "shielding term") is shown to be negligible. We exactly solve the advection-diffusion equation without the shielding term. This solution determines when collisions dominate and when advection (i.e. Landau damping) dominates. Introducing an energy source term that balances the energy lost to dissipation allows for the creation of a steady state distribution function that transfers energy from larger to smaller velocity scales via Landau damping. Unlike the Kolmogorov cascade, this is an energy cascade that occurs completely in velocity space: there is no nonlinearity and the spatial dependence is trivial. We hope that the G transform will be used to simplify gyrokinetic codes or other kinetic models. [1] P. Morrison and D. Pfirsch, Phys Fluids B 4, 3038 (1992); P. Morrison Trans. Theo. Stat. Phys. 29, 397 (2000).

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