Abstract Submitted
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Vlasov Simulation of the Effects of Collisions on the Damping of Electron Plasma Waves[1] JEFF BANKS, Rensselaer Polytechnic Institute, RICHARD BERGER, THOMAS CHAPMAN, Lawrence Livermore National Laboratory, STEPHAN BRUNNER, T. TRAN, Ecole Polytechnique Federale de Lausanne — Kinetic simulation of two dimensional plasma waves through direct discretization of the Vlasov equation may be particularly attractive for situations where minimal numerical fluctuation levels are desired, such as when measuring growth rates of plasma wave instabilities. In many cases collisional effects can be important to the evolution of plasma waves because they both set a minimum damping rate for plasma waves and can scatter particles out of resonance through pitch angle scattering. Here we present Vlasov simulations of evolving electron plasma waves (EPWs) in plasmas of varying collisionality. We consider first the effects of electron-ion pitch angle collisions on the frequency and damping, Landau and collisional, of small-amplitude EPWs for a range of collision rates. In addition, the wave phase velocities are extracted from the simulation results and compared with theory. For this study we use the Eulerian-based kinetic code LOKI that evolves the Vlasov-Poisson system in 2+2-dimensional phase space. We then discuss extensions of the collision operator to include thermalization. Discretization of these collision operators using 4th order accurate conservative finite-differencing will be discussed.

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Jeff Banks
Rensselaer Polytechnic Institute

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