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Anomalous Resistivity Generated By Ion Acoustic Instabilities in Weakly Collisional Plasmas C. BLACK, A. BHATTACHARJEE, KAI GERMASCHEWSKI, Center for Integrated Computation and Analysis of Reconnection and Turbulence, University of New Hampshire — The anomalous resistivity associated with the current-driven ion-acoustic instability has been proposed as a mechanism for magnetic reconnection, and other forms of transport and dissipation. Recently, it has been shown that the underlying eigenmode spectrum of weakly collisional plasmas in the limit of small collisions is fundamentally different from that of collisionless plasmas. This raises the question of how quasilinear predictions of anomalous resistivity derived from the Vlasov equation differ from those obtained from a weakly collisional theory, even in the limit of zero collisions. We compare the predictions of quasilinear theory with simulation results obtained from a code which integrates the kinetic Lenard-Bernstein equation coupled to the Poisson equation. In contrast with recent results that cast doubt on the validity of the classical estimates (obtained by A. Galeev and R. Sagdeev), we find that our results agree well with the classical estimates, even in the presence of weak collisions. Deviations from the classical quasilinear estimates occur in the nonlinear regime when the application of quasilinear theory is open to question. Comparisons are made with other numerical studies in the collisionless regime, including predictions for the saturated electric field.

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