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Nonlinear dependence of anomalous ion-acoustic resistivity on electron drift velocity

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Collisionless magnetic reconnection requires the violation of ideal MHD by various kinetic-scale effects. Recent research has highlighted the potential importance of wave-particle interactions by showing that Vlasov simulations of unstable ion-acoustic waves predict an anomalous resistivity that can be significantly higher in the nonlinear regime than the quasi-linear estimate. Here, we investigate the dependence on the initial electron drift velocity of the current driven ion-acoustic instability and its resulting anomalous resistivity. We examine the properties of statistical ensembles of 10 Vlasov simulations with real mass ratio for a range of drift velocities and for electron to ion temperature ratios 0.9, 1 and 2, relevant to both solar and magnetospheric physics. We show that the ion-acoustic anomalous resistivity depends nonlinearly on the electron drift velocity for the low temperature ratios examined.