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Simulation of ion-acoustic wave excitation, reflection and wave-particle scattering in the presheath[1] LUCAS BEVING, Univ of Iowa, MATTHEW HOPKINS, Sandia National Laboratories (NM), SCOTT BAALRUD, Univ of Iowa — It has been predicted that the ion flow in an ion presheath can excite ion-acoustic waves and that subsequent wave-particle interactions significantly enhance the effective Coulomb collision rate within the presheath. Increased collisionality could explain why ion and electron velocity distribution functions are measured with varying degrees of thermalization at different locations in the presheath. Recent LIF measurements have directly confirmed that the waves are present throughout the presheath, even in regions where linear theory predicts stability. This suggests that the waves are being reflected from the ion sheath, but wave reflection could not be directly diagnosed by the experiment. Here, we use PIC simulations to corroborate the existence of the waves by comparing the power spectrum of density fluctuations to the linear ion-acoustic dispersion relation. The simulations are used to quantify both wave reflection and wave-particle scattering rates that have not been measured experimentally. Wave-particle scattering rates were quantified by calculating time correlations between the distribution fluctuations and the electric-field fluctuations <f E>, while the reflected power was calculated from power spectra.

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