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Ion loss in weakly collisional three ion species plasmas[1] NOAH HERSHKOWITZ, CHI-SHUNG YIP, University of Wisconsin - Madison, GREG SEVERN, University of San Diego — Ion velocity distribution functions (ivdfs) at sheath-presheath boundaries are studied with laser-induced fluorescence in weakly collisional Xe-Kr-Ar and Xe-Ar-Ne plasmas using tunable diode lasers for Ar+ and Xe+ ions. The argon and xenon ivdfs are measured at the sheath-presheath boundary near a negatively biased boundary plate. The plasma potential profiles are measured by an emissive probe throughout the sheath and presheath. Relative ion concentrations resulting from the neutral gas mixtures are calculated using G-H. Kim's loss-production balance method. Ne+ and Kr+ ions are added to plasmas with approximately equal amounts of Ar+ and Xr+ ions, where Ar+ and Xe+ ions are previously observed to reach the sheath edge at nearly the system sound speed. In two ion species plasmas, instability enhanced collisional friction was demonstrated to dictate the escape velocities of the ions. When three ion species are present, it is demonstrated that as the concentration of the third ion species increases, Xe+ and Ar+ ion velocities at the sheath edge deviates from the common sound speed and approach their individual Bohm velocities. These observations are consistent with the predictions of the instability enhanced collisional friction theory

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