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Effect of two ion-species on the propagation of shear Alfven waves[1] G.J. MORALES, S.T. VINCENA, UCLA, J.E. MAGGS — An experimental and theoretical modeling study of the propagation properties of shear Alfven waves of small transverse scale in the presence of two ion-species is presented. In a two-ion plasma, depending on the mass of the heavier species, ion kinetic effects can become prominent, and significant parallel electric fields result in electron acceleration. Theory predicts the appearance of frequency propagation gaps, and spatial structures that mix the cone-propagation characteristics of Alfven waves with radially expanding ion Bernstein modes. The experiments are performed at the Basic Plasma Science Facility (BaPSF) at UCLA and consist of the spatial mapping of shear waves launched by a small disk exciter and by a large loop antenna. A variety of two ion-species combinations are explored by mixing the basic gases Helium, Neon, Argon and Hydrogen to generate highly reproducible plasmas. It is found that propagation bands below the ion cyclotron frequency of each of the two species can be identified, but there appears to be a large damping mechanism whose strength increases with the mass of the heavier species. For a 50-50 mix of Argon-Neon the damping is so severe that no signals can be observed in the Neon propagation band.

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