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Ion-ion Hybrid Alfven Wave Resonator[1] J.E. MAGGS, S.T. VINCENA, G.J. MORALES, W.A. FARMER, UCLA — In a magnetized plasma consisting of two ion species, the perpendicular dielectric coefficient vanishes at the ion-ion hybrid frequency, where shear Alfven waves have zero parallel group velocity and experience a cut-off. Since the ion-ion hybrid frequency is proportional to the magnetic field, it is possible for propagating shear waves to be reflected in regions of increasing magnetic field. Thus, in principle, it is possible for a magnetic well configuration in a two ion plasma to behave as an Alfven wave resonator, as may be encountered in a tokamak or a planetary magnetosphere. This study explores the possibility of establishing such a resonator in the linear plasma column generated in the Large Plasma Device (LAPD) at UCLA using H-He and He-Ne mixtures. The resonator response is investigated by launching monochromatic waves or sharp tone bursts from a rectangular magnetic loop antenna. In a magnetic well, the radial profiles of the wave magnetic field broaden and a line structure emerges in the power spectrum. The profiles of the lines in the spectra resemble global radial modes rather than waves launched from a localized source. The observations are compared to predictions of a square wave model of the well and the Budden transmission model.

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