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Measurements and Modeling of Helicon Wave RF Magnetic Fields CHARLES LEE, GUANGYE CHEN, ROGER BENGTSON, BORIS BREIZMAN, ALEXEY AREFIEV, The University of Texas at Austin — Traveling-wave characteristics of the RF magnetic field were measured in a helicon discharge using an absolutely calibrated, five-turn, magnetic probe with built-in electrostatic rejection. The discharge is created using a 1-kW RF generator at 13.56 MHz using a left-helical antenna. Axial profile measurements of the B_r-component were taken on-axis for the two opposite directions of the static magnetic field. A Fourier transform in the k_z-domain of the magnetic field's amplitude reveals a strong asymmetry: there is a strong peak in the spectrum corresponding to a wave propagating in the anti- parallel direction with respect to the static magnetic field. This observation is consistent with the prediction of the Radially Localized Helicon (RLH) [1] theory. The location of the peak in the k_z-spectrum is also in good agreement with the RLH dispersion relation. Comparison of the data with an RF- field solver [2] shows significant agreement in the amplitude and phase of the magnetic field and its corresponding k_z- spectrum when the electron collision frequency is increased by a factor of ten. [1] B. Breizman and A. Arefiev, Radially Localized Helicon modes in non-uniform plasma, Physical Review Letters, 84:3863, 2000. [2] G. Chen et al., Resonant power absorption in helicon plasma sources, Physics of Plasmas, 13:123507, 2006.

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