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Excitation, propagation and damping of helicon waves in a high density, low temperature plasma J.F. CANESES, Oak Ridge National University, Oak Ridge, TN, B.D. BLACKWELL, Plasma Research Laboratory, Australian National University, Australia — The MAGnetized Plasma Interaction Experiment (MAGPIE) is a helicon linear plasma device built to study fusion relevant plasma-surface interactions. In this work, we investigate helicon wave propagation in high density (10^{18}-10^{19} m^{-3}) low temperature (2-4 eV) magnetized (50-200 G) hydrogen plasma produced by a half-helical antenna operated at 7 MHz and 20 kW. Using the cold dielectric tensor with collisional terms (electron-neutral and Coulomb), helicon wave damping is calculated along the length of MAGPIE using a WKB approximation. Comparison with experiment indicates that wave damping, under these conditions, is entirely collisional. Numerical results from a fully electromagnetic wave code and 2D wavefield measurements indicate that helicon waves are excited at the plasma edge by the antenna's transverse current straps while the helical straps play a secondary role. These waves propagate towards the center of the discharge along the whistler wave ray direction (19 degrees to the background magnetic field), interfere on-axis and form the axial interference pattern commonly observed in helicon devices.

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