Overview of research into fundamental wave processes using the Large Plasma Device

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An overview of research on plasma waves in the Large Plasma Device (LAPD) will be presented. The LAPD is a 17m long, 0.6m diameter magnetized plasma column. Plasmas are produced by discharge using a large-area emissive cathode and have the following typical parameters: $n_e \sim 10^{12}$ cm^{-3}, $T_e \sim 5$eV, $T_i \leq 1$eV, $400 < B < 2000$ G, plasma pulse length $\tau \sim 10$ - 20ms. Studies of waves have been central to research efforts on LAPD, in particular shear Alfvén waves. I will review experiments which have elucidated the linear and nonlinear properties of shear Alfvén waves, including: dispersion and damping of kinetic and inertial Alfvén waves, an Alfvén wave MASER, field line resonances, scattering of fast ions and electrons by shear waves, wave-wave interactions among shear waves, and nonlinear control of gradient-driven instabilities using shear waves. Additionally, I will discuss a new effort to study the physics of fast waves in LAPD, aimed at investigating issues relevant to ICRF in fusion devices.