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Generation of Whistler Wave by a Rotating Magnetic Field Source A. KARAVAEV, K. PAPADOPOULOS, X. SHAO, A.S. SHARMA, Dept. Phys. and Astronomy, Univ. Maryland, A. GIGLIOTTI, W. GEKELMAN, P. PRIBYL, S. VINCENA, Dept. Phys., UCLA — The interaction of Rotating Magnetic Fields (RMF) with plasmas is a fundamental plasma physics problem with implications to fusion, space propulsion, control of energetic population in the radiation belts. In this paper we report recent experiments on the generation of whistler waves with a new type RMF-based antenna. The experiments were conducted on UCLA's Large Plasma Device (LAPD). The RMF is created using poly-phased loop antennas. A number of parameter combinations, e.g. plasma density, background magnetic field, and driving current, were used. It was found that RMF created by a two loop antenna drives significant currents along the ambient magnetic field. The measured amplitude of induced wave field was proportional to the square-root of the plasma density. The spatial decay rate for the wave perturbation across the background magnetic field scales with the plasma skin depth. We also present analytic and simulation results that account for the experimental results; in particular, the scaling of the induced magnetic field as a function of the RMF and plasma parameters. Applications of RMF as an efficient radiation source of plasma waves in space plasmas will be discussed. This work was sponsored by ONR MURI Grant 5-28828.

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