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Alfven Wave Generation by a Rotating Magnetic Field Source: Theory, Modeling and Experimental Results A.S. SHARMA, A.V. KARAVAEV, N. GUMEROV, X. SHAO, K. PAPADOPOULOS, Dept. of Physics and Astronomy, Univ. of Maryland, W. GEKELMAN, Y. WANG, S. VINCENA, P. PRIBYL, Dept. of Physics and Astronomy, UCLA — Recent experiments conducted in the Large Plasma Device (LAPD) located at UCLA demonstrated efficient excitation of whistler and shear Alfven waves by a Rotating Magnetic Field (RMF) source. We present analytical theory, computational modeling and experimental results of the shear Alfven wave excitation by RMF source created by a phased orthogonal two-loop antenna in a plasma. An analytical theory and simulations using a three-dimensional cold two-fluid model of Alfven wave excitation were developed and compared with experiments. These comparisons show good agreement on linear shear Alfven wave properties, namely, spatio-temporal wave structure, dispersion relation, and the dependence of wave magnitude on the wave frequency. From the simulations it was found that the energy of the Alfven wave generated by the rotating magnetic field source is distributed among the kinetic energies of ions and electrons and the electromagnetic energy of the wave. The wave magnetic field power calculated from the experimental data and using a fluid model agrees within $\sim$1 percent. The RMF source is thus very efficient in generating shear Alfven waves. Work supported by ONR MURI grant.

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