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Pitch Angle Scattering of Energetic Particles by Waves Generated from a Rotating Magnetic Field Source A. KARAVAEV, X. SHAO, A.S. SHARMA, K. PAPADOPOULOS, N.A. GUMEROV, Univ. of Maryland, A. GIGLIOTTI, W. GEKELMAN, UCLA Dept. Physics — Injection of whistler waves into Earth's inner radiation belt to enhance precipitation of energetic electrons has been an active research area. Most mechanisms of pitch angle scattering of energetic particles are based on gyro-resonant wave-particle interaction. Recent experiments and simulations show that Rotating Magnetic Field (RMF) antennas in plasmas can be efficient radiation sources of MHD and whistler waves. In experiments conducted in the Large Plasma Device at UCLA, poly-phased current loops drove the RMF antenna. These experiments and simulations show that 75-85% of the radiation generated is in guided propagation. The waves have non-local magnetic field gradients in the transverse direction and these provide ways to break the adiabatic invariants of electrons and precipitate them via a non-resonant scattering. Here we present simulations of non-resonant pitch angle scattering of particles by waves generated by RMF sources. EMHD simulations are used to model whistlers and the resultant EM fields are used in particle tracing codes to study pitch angle scattering. The simulations are conducted for a wide range of wave magnetic fields, including fields much larger than the ambient magnetic field in space plasma environments. The work was sponsored by ONR MURI grant.

Xi Shao
University of Maryland

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