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Generation of VLF Waves to Provide Efficient Interaction with Energetic Electrons in a Radiation Belt V. SOTNIKOV, J. CAPLINGER, T. KIM, Air Force Research Laboratory, Sensors Directorate, Wright-Patterson AFB, OH 45433, E. MISHIN, Air Force Research Laboratory, Space Vehicles Directorate, Kirtland AFB, NM 87117, N. GERSHENZON, D. MAIN, T2Sys Inc., Beavercreek, OH 43432 — Whistler waves interact with radiation belt (RB) electrons via cyclotron resonance. This interaction leads to enhanced pitch angle diffusion and shifting energetic electrons towards the loss cone. In order for this interaction to be efficient it is necessary to create curtain level of finite amplitude VLF electromagnetic whistler waves in the interaction region. We will examine different sources for VLF whistler wave excitation including conventional loop antennas and parametric antennas. In the case of conventional sources a great deal of the source power is radiated not as a whistler wave but as a quasi-electrostatic low oblique resonance (LOR) mode which does not propagate on great distances from the source region. Only a small percentage of the power is radiated as the electromagnetic whistler wave. We present results on parametric interaction of LOR waves with ion acoustic (IA) waves and extremely low frequency (ELF) waves to demonstrate the possibility to overcome this difficulty. Additionally, particle-in-cell (PIC) simulations, which demonstrate the excitation and spatial structure of VLF waves excited by conventional and parametric antennas are presented.

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