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Investigation of Parametric Excitation of Whistler Waves Using 3D Particle-In-Cell Simulations JAMES CAPLINGER, VLADIMIR SOTNIKOV, Air Force Research Laboratory, DANIEL MAIN, T2 Sys., DAVID ROSE, IOANA PARASCHIV, Voss Scientific — Previous theoretical work has shown that a parametric interaction between quasi-electrostatic lower oblique resonance (LOR) and lower frequency ($\omega < \omega$LH) ion acoustic or extremely low frequency (ELF) waves can produce electromagnetic whistler waves in a cold magnetized plasma. It was also demonstrated theoretically that this interaction can more efficiently generate electromagnetic whistler waves than by direct excitation by a conventional loop antenna, operating at a single frequency. For the purpose of numerically validating the above result, a series of particle-in-cell simulations were carried out. We first demonstrate the ability to accurately model whistler wave excitation producing the familiar resonant surfaces which comprise the LOR using a modeled loop antenna. Next we demonstrate the ability to generate ion acoustic waves as well as ELF waves, both of which are shown to agree with the expected linear dispersion relations. Finally, we investigate the existence of any nonlinear interaction which indicates the desired parametric excitation and attempt to analyze the efficiency of this method of excitation and radiated power going into the whistler part of the VLF wave spectrum.

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