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Electromagnetic ion cyclotron waves in the Earth's magnetosphere with losscone distribution

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Satellite observations in the magnetosphere have shown that Pc 1, 2 waves with frequencies (0.1-5Hz) below the hydrogen gyrofrequency have left-handed to linear polarization and are related to electromagnetic ion cyclotron (EMIC) waves. The parallel propagating EMIC waves are left circularly polarized wave (L-mode) and at oblique propagation, they are coupled to the right hand circularly polarized waves (R-mode). These waves exist in three distinct wave bands, e.g., H+ - band, He+ - band and O+- band below their gyro-frequencies. The EMIC waves can be driven unstable with hot protons having anisotropic distributions in temperatures and their source region is near the equator. These waves play an important role in the acceleration, heating of ions and precipitation of magnetospheric particles. These waves are observed almost all regions of the Earth's and planetary magnetospheres, and on the ground in high latitude regions. Theoretically, they have been studied by taking into account bi-Maxwellian distribution of hot protons. Whereas, there have been very few studies on EMIC waves generated by losscone distribution of hot protons. In this work, we investigate the generation of EMIC waves in the inner magnetospheric plasma composed of electrons, cold and hot protons (H+, and heavier He+ and O+ ions. Hot protons are considered to be having losscone like particle distribution with temperature anisotropy. The losscone distribution for hot, H+ ions is introduced through the two subtracted Maxwellians. The numerical computations are carried out using plasma dispersion solver KUPDAP. The plasma parameters for the study are used from the CLUSTER observations in the inner magnetosphere.