EIGENMODES OF LINEAR POLARIZED EMIC WAVES IN THE MANGETOSPHERE

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Field-aligned eigenmodes can be excited by mode conversion of compressional waves propagating across magnetospheric field lines. For low frequencies, the mode conversion occurs at the Alfven resonance, but mode conversion may also occur for higher frequencies at the ion-ion hybrid (IIH) resonance in multi-ion plasmas. Because the mode-converted waves at the IIH resonance are electromagnetic and have linear polarization, it has been suggested as a mechanism to explain linearly polarized electromagnetic ion cyclotron (EMIC) waves at Earth's magnetosphere. These waves propagate along the magnetic field and set up field-aligned eigenmodes localized between the Buchsbaum resonances. The mode converted waves can also excite global Alfven resonances that stand between the ionospheres. The aim of this study is to determine the dependence of the eigenmodes of the mode-converted wave at the IIH resonance on the concentration of heavy ions in Earth magnetosphere. To achieve this goal, we examine the eigenfrequencies of IIH resonances using the WKB method. For this study, we use an axisymmetric dipole magnetic field model and empirical electron density model between 3 and 9 Earth radii L shell. For different heavy ion concentration ratio, the eigenfrequencies and their maximum latitudinal extent are presented. The results show that the linear polarized waves are localized near the magnetic equator and the frequency increases as the heavy ion concentration ratio increases. We also compare the results with satellite observations of EMIC waves.

EMIC wave, Linear polarization, Eigenmode

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