

Electromagnetic ion cyclotron waves and associated ion velocity distributions: Cluster observations

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This study presents the observations of electromagnetic ion cyclotron (EMIC) waves in the solar wind and Earth's magnetosphere using the Cluster observations. We also present the observations of ion velocity distribution functions (VDFs) at the time of enhancement of the wave. It is found that the observed ion VDFs possess low-dense ion beams in addition to the high energy tails as compared to the Maxwellian distribution. By using the observed plasma parameters at times when wave activity is at his peak, we numerically solve the full dispersion relation of EMIC waves and obtained the real frequency and growth rate expressions. We then investigate the effect of superthermal particles and ion beam on the growth rates of the EMIC waves.