Abstract

In this thesis, we studied the obliquely propagating electromagnetic ion cyclotron (EMIC) waves in Maxwellian and non-Maxwellian plasmas. Since space plasmas are in general collisionless, with an average unity collision rate at 1 AU, the particle distribution functions are observed with non-thermal features such as the presence of high energy tail. Whenever, distribution functions contain high energy tail, kappa distribution is the most common choice to fit the distribution. Therefore, in this thesis we employed both the ideal Maxwellian and kappa distribution functions to study the propagation characteristics of the obliquely propagating EMIC waves. We first derived the general hot plasma dielectric tensor for oblique propagation with and without the beam and then by employing Maxwellian and kappa distributions, obtained the general dispersion relation of EMIC waves. The dispersion relation for both the cases then numerically studied and found that ion temperature anisotropy is the main cause of triggering the EMIC instability and growth increases with the increase of temperature anisotropy. We also found that maximum growth is obtained for the parallel propagation case and it decreases as the wave propagation angle increases. It is also found that instability increases with the increase of ion beam velocity.