Abstract

The thesis is focused on the study of drift effects through density inhomogeneity on the dispersive and compressional Alfvén waves taking into account the temperature anisotropy and Larmor radii effects. Using gyrokinetic theory, Vlasov kinetic equation is solved and the dielectric tensor for non-relativistic, magnetized, bi-Maxwellian plasmas is calculated. A generalized dispersion relation for kinetic Alfvén waves is derived (Ch.2). The modified dispersion relation thus obtained is then used to examine the propagation characteristics of the kinetic Alfvén waves in the inertial regime (Ch.3), kinetic regime (Ch.4) and magnetosonic waves (Ch.5). For inertial Alfvén waves (IAWs), in the case of real dispersion relation, the usual trend is the increase in phase velocity with the density inhomogeneity. In case of kinetic Alfvén waves in the kinetic regime (KKAWs), the coupling of drift waves and KKAWs is observed. Using wave-particle interactions, the growth rates of these drift waves (resonance type) instabilities are calculated for IAWs and KKAWs. The stabilization mechanism of the drift Alfvén waves instabilities and their dependence on the temperature anisotropy is highlighted. The threshold conditions for a wide range of parameters are also discussed. At the end (in chapter 5), a generalized dispersion relation of obliquely propagating drift magnetosonic wave is derived with temperature anisotropy and a hydrodynamic type instability is investigated. The stability analysis is performed and the estimation of the growth rate is also presented to understand the stabilization mechanism of drift magnetosonic wave instability. The results show that the drift effects due to density inhomogeneity tend to make these waves unstable whereas the temperature anisotropy provides a mechanism to stabilize the instabilities.