Theoretical Approach to study magnetosonic Waves

Amrutha

Magnetosonic waves are low-frequency waves spanning from cyclotron frequency of protons to lower hybrid frequency. These waves propagate nearly perpendicular to the ambient magnetic field. They are observed in the inner magnetosphere of the Earth and satellite observations show that magnetosonic waves are generated due to the ring-like distribution of protons. Dispersion relation for magnetosonic waves can be obtained using the fluid approach in the magnetohydrodynamic (MHD) limit. However, in many satellite observations, it is evident that these waves in the inner magnetosphere are found at very small spatial scales, which cannot be explained using the MHD theory. Hence analysis is to be made using kinetic theory which can incorporate smaller spatial and time scales into account. Magnetosonic waves and the theoretical approach used to arrive at the wave dispersion relation will be discussed.