Abstract

Expansion/compression in the radially expanding earth magnetosphere plasma generates the temperature anisotropy in the charge species which act as free energy to excite instabilities. In the poorly collisional magnetosphere plasma, these spontaneously generated microinstabilities always act back on the particle distributions and define the earth magnetosphere states below the marginal stability conditions. Among the different unstable modes, electromagnetic proton/ion cyclotron is the left-hand wave which is excited under large perpendicular temperature of protons i.e. $T_{\perp_p} > T_{\parallel_p}$. Based on the observations of various space missions, we assume the magnetosphere protons as bi-Maxwellians distributed with their distinct cold and hot components. To catch the time-evolution of wave-energy density and proton temperatures, we employ a macroscopic quasilinear theory by taking different combinations of temperature anisotropy ratios and plasma betas associated with both cold-hot protons. With the inclusion of suprathermal and inhomogeneities effects, our results may be important for the understanding of global kinetic earth magnetosphere modeling.