Abstract

In this thesis, we studied Alfvenic double layer in three component space plasmas that consists of cold and hot electrons, ions. Double layers and field aligned potential can accelerate solar wind particles and contribute to the energy release in solar flares, impacting space weather and potentially affecting Earth's magnetosphere and technology. In different regions of magnetosphere, nonthermal distribution has been observed abundantly. Generalized (r, q) distribution has also been observed around the region of magnetic reconnection, bow shock and solar wind. We performed linear and non linear analysis of kinetic Alfven wave by using a set of fluid equations and considering that electrons follow generalized (r, q) distribution function. From linear dispersion relation, we found that by increasing population of hot electrons frequency increases both for solw and fast mode. Also, by doing nonlinear analysis we derived Sagdeev potential equation and got the numerical solutions for Alfvenic double layers. Existence regime of these double layers has been plotted showing the range of Alfvenic Mach number for different obliqueness. We found that compressive and rarefactive both double layers exit for different values of (r, q) and for a range of Mach number and plasma beta.