Abstract

In this thesis, we have studied the double layer (DL) structures associated with the nonlinear kinetic Alfvén waves in multi-component electron-positron-ion (*e-p-i*) low-β plasma. Ions are taken as inertially cold whereas electrons and positrons are assumed to be Maxwellian as well as non-Maxwellian such as kappa and *(r, q)* distributed. The multi-fluid theory and fully nonlinear Sagdeev potential approach is used to describe the nonlinear structures such as double layer. We have seen that the characteristics of the kinetic Alfvénic DLs are significantly modified due to the propagation angle θ, Alfvénic Mach number M_A, positron concentration p and spectral indices such as κ , r and q. Our current study support both the compressive and rarefactive double layer (DL) structures. We have seen that by decreasing the high energy particles in the distribution, the strength and steepness of DL increase and approach towards the Maxwellian values.