

## ABSTRACT

In ultra-relativistic electron-positron plasmas there are certain environments which can neither be termed as fully degenerate, nor non-degenerate. This phenomenon is known as arbitrary degeneracy. We used Vlasov model in connection with Maxwell's equations, the dispersion relation for Upper hybrid mode is derived for ultra-relativistic electron-positron plasma. In particular the dispersion relation is analyzed in weak ambient magnetic field limit  $|\omega - \mathbf{k} \cdot \mathbf{v}| > \Omega$ . The polarization tensor component  $\Pi_{xx}$  associated with electrostatic wave for ultra-relativistic electron positron plasma is examined. The angle integrations are performed and momentum integration results obtained by applying ultra-relativistic Fermi-Dirac distribution function for electron-positron including their chemical potentials. The momentum integrations are particularly obtained in terms of Polylog functions  $L_{i,sn}(-e^{-\frac{\mu_s}{T}})$  where "s" stands for species. We have represented integral moments of Fermi-Dirac distribution in the form of Polylog function  $L_{i\alpha}$  and obtained the dispersion relation for upper hybrid mode in ultra-relativistic electron positron plasma in the presence of ambient magnet field.