

Abstract

In this dissertation, we have derived the dispersion relations for dust ion-acoustic and dust acoustic modes by incorporating different dust parameters such as dust charge fluctuations, dust neutral collisions and dust self-gravitation. The fluid treatment of dusty plasma is used to derive the general dielectric constant, and then general dispersion relations for dust ion-acoustic and dust acoustic modes are discussed in detail. Charge fluctuations are determined by considering the dynamics of charging processes associated with plasma currents. Expression for charging currents also derived using Maxwellian and kappa distribution functions. The *dispersion relation of dust ion-acoustic and dust acoustic waves* are modified when we employ *non-Maxwellian distribution such as kappa distribution functions*. Numerical results with Maxwellian and kappa distribution are also presented with the help of different plots for different parameters.