ABSTRACT

The parametric decay instability of dust-ion-acoustic wave into a relatively low frequency dust-lower-hybrid and dust-acoustic waves has been investigated in detail in a dusty plasmas in the presence of external/ambient uniform magnetic field. Magnetohydrodynamic fluid equations of plasmas have been employed to find the linear and nonlinear response of the plasma particles for this three-wave nonlinear coupling of the electrostatic waves in the dusty plasma. Here, the relatively high frequency electrostatic dust-ion-acoustic wave has been taken as the pump wave. It couples with other two low-frequency internal possible modes of the dusty magnetoplasma, viz. the dust-lower-hybrid and dust-acoustic waves. The nonlinear dispersion relation of the dust-lower-hybrid waves has been solved to obtain the growth rate of the parametric decay instability. It is found that the growth rate of the parametric instability increases linearly with pump-induced velocity of electrons. The growth rate is maximum for small value of external magnetic field $\mathbf{B_0}$. It is noticed that the growth rate is directly proportional to the unperturbed electron number density n_{0e}. There is inverse relationship between growth rate and mass of dust grain m_d.