SP2

Kelvin-Helmholtz and Rayleigh-Taylor instabilities in magnetized incompressible dusty fluids

R. K. Chhajlani[1,*] and R. P. Prajapati[2]

[1]School of Studies in Physics, Vikram University, Ujjain 456010, M.P., India

[2]Department of Pure and Applied Physics, Guru Ghasidas Central University, Bilaspur 495009, C.G., India

*Presenting author's e-mail: chhajlanirk@yahoo.com

We investigate the effects of different dust flow velocities and two dimensional magnetic fields on the combined Kelvin-Helmholtz instability (KHI) and Rayleigh-Taylor instability (RTI) of two superimposed incompressible dusty fluids. A single fluid reduced dusty magneto-hydrodynamic model is derived for the three component magnetized incompressible dusty plasma. The general dispersion relations for RT and KH configurations are obtained using appropriate boundary conditions and discussed in the case of equal and different dust fluid flow velocities. In the case of the stable RT configuration, we find that the condition of RTI depends upon both longitudinal and transverse magnetic field components and relative dust flow velocity. In the case of the KH configuration, the effect of magnetic field and relative dust flow velocity is observed and it is shown that dust flow velocity must be larger than a particular value of Alfven speed in order to excite KHI. Numerical calculations have been performed to illustrate the linear growth rates of RTI and KHI in both magnetized and un-magnetized dusty plasmas. We observe that the magnetic field has stabilizing whereas the dust Atwood number has destabilizing influence on the growth rate of RTI. The different dust flow velocities have destabilizing whereas magnetic field has stabilizing influence on the growth rate of KHI in dusty plasmas. The dust Mach number yields a stabilizing influence on the linear growth rate of KHI.