Self-gravitational Instability of Dusty Plasma with Radiative Cooling Functions and Dust charge Fluctuation with Dust Temperature

Sachin Kaothekar[1]
[1]Department of Physics, Prashanti Institute of Technology & Science, Ujjain-456010, M.P., India.
e-mail (speaker): sachinmgi007@gmail.com
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A theoretical study has been carried out to represent the impacts of dust temperature, dust charge fluctuation and external magnetic field on radiative condensation instability in self-gravitating magnetized hot dusty plasma. It is assumed that a three component plasma having electrons, ions and charged dust grains, in which electrons are inertia-less having finite thermal conductivity and ions are inertia-less having infinite thermal conductivity. The medium consists of extremely massive hot dust grains with variable charge. The basic equations of the problem are constructed and linearized. A general dispersion relation is carried out using the normal mode analysis method. It is observed that the Jeans-gravitational condition of instability is amended by dust charge fluctuation, dust temperature and radiative effects. Numerical calculations have been performed to represent the effects of various parameters on the growth rate of radiative condensation instability and Jeans-gravitational instability.

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