

ELECTRO-STATIC INSTABILITY IN STAR FORMING MOLECULAR CLOUD

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Abstract: The gravitational collapse of partially charged dusty plasma of multi-fluids, where along with the usual gravitational, thermal, and frictional dragging forces, there exists Lorentz forces, is studied. To include the neutral background resistance (drag) and the magnetic forces during the gravitational collapse of the weakly ionized dusty magnetized plasma, non-Boltzmannian distribution for electrons and ions is used. The magnetic field enters in calculation through the Larmour gyromagnetic frequency of different charge species in the multi-fluid plasma. The equations of motion for different species of the multi-fluid plasma are linearized by assuming the perturbation (fluctuation) response in radial direction as a mathematical analogue of x-direction in plane geometry approximation in the form $f \sim \exp(ikx - i\omega t)$. The Jeans swindle is used as a local approximation for the equilibrium and the usual normal mode analysis is used to derive the dispersion relation. An analytical solution to the dispersion equation for different situations is given with an explanation of the effects on star formation.

Key words: ISM--Dusty Plasma---neutral Drag---Gravitational Collapse---Jeans Swindle.