Jeans' Gravitational Instability of a Thermally Conducting, Unbounded, Partially Ionized Plasma

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The gravitational instability of an infinitely extending homogenous, partially ionized plasma, permeated by an oblique magnetic field, has been studied to investigate the effects of Hall currents, finite conductivity, viscosity, collision with neutrals and thermal conductivity on the growth rate of the disturbance. The dispersion relation obtained has been solved numerically, and it has been found that Hall currents and collision with neutrals have a destabilizing influence on the growth rate while the other mechanisms reinforce the gravitational instability. Jeans' criterion, derived within a purely hydrodynamic framework, has been rediscussed along a nonextensive kinetic theory. A new Jeans' criterion was deduced, which depends on the nonextensive parameter q and the standard Jeans' wave number is recovered in the limiting case $q = 1$.

Key words: Partially Ionized; Jeans' Criterion; Thermal Conductivity.