Abstract

Quantum effects are investigated in highly dense and supercooled plasmas. Diverse issues are brought under consideration right from the fundamental subject i.e. Debye shielding to linear and nonlinear, electrostatic and electromagnetic waves in a simple electron-ion and multicomponent, magnetized and unmagnetized, unbounded and bounded plasmas. Quantum fluid equations are used to describe the quantum behavior of the comparatively lighter particles e.g. electrons and positrons. The Debye shielding which is the basic parameter of collective interaction in plasma is worked out for quantum plasma. It is found that quantum effects change the screening length which consequently, set the plasma to modified collective behavior. The quantum magnetohydrodynamic model and then reductive perturbation technique is incorporated to study the linear and nonlinear magnetoacoustic modes of propagation in electron-positron-ion (e-p-i) plasma with quantum effects. Also, the effects of positron concentration, obliqueness and magnetic field are investigated to both on fast and slow modes. The nonlinear behavior due to the trapping of particles in wave potential in a self-gravitating quantum dusty plasma along with the modulational instability is encountered. The nonlinear structures under the trapping and gravitational potential effects are analyzed by employing the Sagdeev potential approach. Finally, in bounded plasma, the dust-lower-hybrid surface wave is discussed in both, classical and quantum, regimes.