

عنوان مقاله:

Compressive and rarefactive dust-ion acoustic solitary waves in four components quantum plasma with dust-charge variation

محل انتشار:

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خلاصه مقاله:

Based on quantum hydrodynamics theory (QHD), the propagation of nonlinear quantum dust-ion acoustic (QDIA) solitary waves in a collision-less, unmagnetized four component quantum plasma consisting of electrons, positrons, ions and stationary negatively charged dust grains with dust charge variation is investigated using reductive perturbation method. The charging current to the dust grains carried by the plasma particle, has been calculated with the orbit-limited motion approach. The quantum current of electrons and positrons is obtained by using Fermi-distribution functions. The basic features of QDIA solitary waves are studied by deriving the Korteweg-de Vries (KdV) Equation. It is found that both rarefactive and compressive type of solitons can exist in the model plasma. Further, the nonlinear and dispersive coefficients in KdV equation are modified by consideration dust charge variation effect and Fermi-Dirac distribution function. The present investigations should be useful for researches on astrophysical plasmas as well as for ultra small micro- and nano- electronic devices.

کلمات کلیدی:

Quantum plasma, Dust ion acoustic solitary wave, (KdV) equation, Dust charge variation, Fermi-distribution functions

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