

Dust acoustic Gardner solitons in superthermal plasma with electron beamNimardeep Kaur¹, Papihra Sethi, N. S. Saini¹¹ *Department of Physics, Guru Nanak Dev University, Amritsar, India*

The propagation characteristics of different kind of solitary structures in plasmas are significantly modified by the energetic charged particles such as ion/electron beams. A stream of high energy electrons interacting with the background plasma plays an important role in the different kind of astrophysical phenomena (e.g. in solar bow shock and Earth's foreshock emission). The satellite observations confirm that energetic superthermal electrons are also found to exist in most of space and astrophysical environments. In this investigation, we have presented the study of propagation properties of nonlinear structures (viz., dust acoustic solitary waves) in unmagnetized plasma composed of dust fluid, superthermal electrons which is embedded by an electron beam. Nonlinear equations (KdV, mKdV and Gardner) are derived using the reductive perturbation method and their solutions are determined to study different characteristics. We have analyzed the influence of various plasma parameters viz. superthermality of electrons, concentration of electrons and electron beam, temperature and velocity of electron beam etc. on the characteristics (such as amplitude, width, polarity etc.) of dust acoustic nonlinear structures and Gardner solitons. This study may be helpful for understanding the insight physics of various kinds of nonlinear electrostatic excitations in space, astrophysical and laboratory plasmas where the combined presence of ions, electron beam and excess superthermal electrons may be encountered.