Small amplitude dust-acoustic solitary waves in multicomponent nonextensive dusty plasma

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Dust is omnipresent in space and in astrophysical environments. Over the last many years, there has been a great deal of interest in dusty plasmas, because of its wide range of applications in different fields (research and technology). Plasmas with particles obeying non-Maxwellian velocity distribution are crucial to the understanding of space and astrophysical plasma dynamics. The nonextensive distribution is the most generalized distribution to study the linear and nonlinear properties of solitary waves in various plasma systems. We have considered an unmagnetized dusty plasma system consisting of nonextensive two temperature ions and nonextensive electrons. Employing reductive perturbation method, we have derived the Kordeweg-de Vries (KdV) equation. It is observed that dust concentration and nonextensivity of ions as well as electrons significantly influence the amplitude and width of dust-acoustic solitary waves. The results of this investigation may be important for understanding the nonlinear solitary structures in astrophysical and space plasmas environments.

References
