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Influence of superthermal electrons on propagation of arbitrary amplitude ion-acoustic solitons in a plasma with negative ions

M R Rouhani and Z Ebne Abbasi

Department of Physics, Alzahra University, Tehran

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Abstract

Investigation of ion acoustic solitons in three component plasma including positive and negative ions and Maxwellian electrons shows that negative to positive relative ion density plays a critical role so that by changing v over the range of $0 < v < 1$ compressive or rarefactive solitons will propagate. In this paper, it is shown that due to the superthermal electrons, there are three domains for v so that in the first one only compressive solitons are allowed, in the second one compressive and rarefactive solitons coexist together and in the third one only rarefactive solitons are observed. The results from sagdeev potential in weak nonlinear region are in good agreement with analytic results obtained from KdV equation.

Keywords: superthermal electrons, rarefactive solitons, negative ion plasma

For full article, refer to the Persian section