

عنوان مقاله:

Effect of Nonextensive Perturbation on Ion Acoustic Solitons

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خلاصه مقاله:

The behavior of ion acoustic wave (IAW) is studied in an electron-ion plasma consisting of cold ions and nonextensive electrons. In this study, the reductive perturbation method is used and the new point is the non-uniformity of the nonextensive parameter in the media. We want to achieve more realistic results of ion acoustic wave behavior by better using the reductive method. In fact, the variation in the behavior of ion acoustic wave when it encounters the nonextensity perturbation region is examined. Perturbation area is a part of plasma where the nonextensivity changes slightly. Therefore, the presence of nonextensivity is introduced as the first order perturbation and the phase velocity is applied as a fixed parameter in the calculations. The modified KdV (mKdV) equation is derived to describe the behavior of the ion acoustic wave propagation in this model. The obtained equation clarifies the change of the soliton profile when moving in all through the perturbation area. Our numerical results show that part of ion acoustic waves propagates as oscillatory shock wave in the perturbed area. The results of this investigation can be helpful for understanding the behavior of ion acoustic waves in an astrophysical environment and space plasmas with varying (nonextensivity (Qiu et al., ۲۰۲۰; Silva et al., ۱۹۹۸; Lima et al., ۲۰۰۰.

کلمات کلیدی:

Ion acoustic, Soliton, Shock, Modified KdV equation, Perturbation, Nonextensivity

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