



Nonlinear ion-acoustic solitary waves with warm ions and non-Maxwellian electrons in space plasmas

Khalid Hussain Shah (1) and Nouman Qureshi (2)

(1) FC College (A Chartered University), Lahore, Pakistan (khalid_chep34@yahoo.com), (2) GC University, Lahore 54000, Pakistan (nouman_sarwar@yahoo.com)

Electrons velocity distributions are often observed with non-Maxwellian features such flat tops at low energies and/or superthermal tails at high energies from different regions of near Earth plasmas such as Earth's bow shock, auroral zone and magnetosphere by numerous satellites. Such non-Maxwellian distributions are well modelled by generalized (r,q) distribution or Cairns distribution. Solitons are nonlinear solitary structures and are integral part of space plasmas. In this paper, we present a fluid model containing Cairns (r,q) distributed non-Maxwellian electrons and derive the Sagdeev potential for fully nonlinear fluid equations. We found that compressive solitons can be developed in such a plasma. The results from our model can be used to interpret solitary structures in space plasmas when electrons are obeying the non-Maxwellian flat tops along with the high energy tails.