

# Abstract

In this thesis, we investigated the existence and propagation characteristics of ion-acoustic shock waves in five component cometary plasma comprising of positively and negatively charged oxygen ions, hot and slightly colder electrons and hydrogen ions. In our analysis, the hot solar wind origin electrons, cold cometary origin electrons and solar wind hydrogen ions are first modelled by Maxwellian distribution and then by Kappa and generalized  $(r, q)$  distributions. The Korteweg-de Vries-Burger (KdV-Burger) equation is derived for such five component cometary plasma for each distribution and the impact of various plasma parameters and spectral indices such as  $\kappa, r$  and  $q$  have been investigated on the amplitude, strength as well as steepness of the shock structures. We found that for all three cases, only rarefactive shock structures are possible. We concluded that the shock structures in cometary plasma are in a transition state from shock to soliton.