Dust Ion Acoustic Modified Korteweg-de Vries Solitons in Dusty Plasmas with Boltzmann Electrons

Samiran Das[1] and D. C. Das[2]

[1]*Department of Mathematics, Central Institute of Technology Kokrajhar, BTR, Assam 783370, India*

[2]*Department of Mathematics, Barnagar College, Sorbhog, Barpeta 781317, India*

For this multicomponent dusty plasma consisting of ions, Bolzmann electrons and mobile dusts, interesting results of dust ion-acoustic KdV solitons were already shown. In this paper we incorporate higher order nonlinearity and more interesting characteristics of dust ion acoustic solitons by deriving modified Korteweg-de Vries (mKdV) equation. We observe that for inclusion of higher order nonlinearity, compressive or rarefactive mKdV solitons of much higher amplitudes exists. The drastic change in growth of amplitudes of the mKdV solitons for different pairs of ions and electrons streaming in presence of mobile dusts is a salient feature of this investigation. Mobile dusts and number of charges contained in a dust particle (Z_d) also plays very important role in the formation of mKdV solitons in this plasma model.