

Abstract

The current study investigates the behavior of small amplitude solitons in a multi-species plasma with dust impurity and two-temperature electrons following the Cairns distribution. The thesis contains the derivation of the equations such as the Kadomtsev-Petviashvili (KP), modified KP (MKP) and coupled KP (CKP) equations using a reductive perturbation method. Solutions for these equations are presented by using a single-variable transformation to examine how different plasma parameters and higher-order effects affect the characteristics of dust ion-acoustic (DIA) solitons. The thesis investigates the soliton solutions obtained from the KP, MKP and CKP equations. Especially, this study emphasizes that a variety of physical parameters significantly influence how various types of small amplitude DIA solitons behave.