Small amplitude solitary waves in the lunar wake plasma

R. Rubia, S.V. Singh and G.S. Lakhina

Affiliation: Indian Institute of Geomagnetism, Navi Mumbai, 410218

E-mail: rubi.r92@gmail.com

Abstract

The propagation of solitary waves in a magnetized four-component plasma comprising of protons, α-particles streaming with respect to protons in the direction of the ambient magnetic field, electron beam and suprathermal electrons with κ-distribution is investigated in a small amplitude limit using reductive perturbation theory. The solitons are considered to be propagating obliquely to the ambient magnetic field, which is assumed to be in the (x, z)-plane. The dynamics of the solitons is governed by the Korteweg-de-Vries (KdV) equation. The solution of the KdV equation predicts the existence of positive potential slow and fast ion-acoustic solitons and electron-acoustic solitons. The effects of spectral index, κ, the angle of propagation, θ, speed of the α-particles and temperature on the characteristics of the solitons are studied. The proposed plasma model is relevant to the observed electrostatic waves in the lunar wake plasma.