Small amplitude of ion-acoustic soliton in magnetized plasma with nonthermal electrons

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Abstract

Using reductive perturbation method in magnetized plasma consisting of ions, positrons and nonthermal electrons in small but finite amplitude limit. Zakharov-Kuznetsov equation for ion-acoustic waves is derived. Propagation characteristics of ion-acoustic solitary waves in three dimensional space are analyzed to determine their existence region. Investigations reveal that ion-acoustic solitary pulses may exist in such plasma and presence of nonthermal electrons significantly affects the amplitude and width of solitary pulses. The amplitude of soliton increases with increase in ion temperature ratio and positron concentration, however decreases with increase in nonthermal electron parameter keeping other plasma parameters constant. Width of soliton increases with increase in parameters ion temperature ratio,positron concentration and nonthermal electrons.

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