Nonlinear Kinetic Alfven Waves In A Two Temperature Electrons Plasmas

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The space plasmas witness the release of energetic particles from solar wind. The physical mechanism responsible for acceleration of energetic particles from solar wind is still unresolved. Alfven waves (AWs), a low-frequency electromagnetic wave propagating in magnetized plasma, arise from the balance between the magnetic field tension and the ion inertia which seem to play an important role in accelerating the charged particles in the space plasma environments. Therefore, it is believed that AWs are a good agent for energy and momentum transfer in many geophysical and astrophysical phenomena [1]. Alfven waves are very important throughout the solar system. Kinetic Alfven waves (KAWs) can be created when Alfven waves develop a large perpendicular wave number transverse to the ambient magnetic field [2] and may accelerate electrons and ions. The dispersion of the wave perpendicular to the external magnetic field is provided by the averaged ion Larmor radius caused by the pressures of the electrons of two different temperatures acting on the ion via the self-consistent electrostatic field. The balance of the wave dispersive and nonlinear effects can give rise to localized solitary waves. The characteristics of nonlinear KAWs are studied in a plasma consisting of positively charged ions as fluid and two temperature electrons obeying Boltzmann distribution. The Sagdeev pseudopotential approach is employed to drive the energy balance equation. The combined effects of physical parameters, such as concentration and temperature of cool electrons, play a significant role to modify the solitary structures. Findings of this investigation may be useful in understanding the formation as well as properties of large amplitude localized electromagnetic excitations in laboratory, space and astrophysical plasmas.

[1] B K Das, R P Sharma and N Yadav, *J. Plasma Phys.* **79**, 833 (2013)
[2] J R Stefant, *Phys. Fluids* **13**, 440 (1970)