

On the evolution of nonlinear ion acoustic waves and their stability in an unmagnetized plasma

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One dimensional fluid simulation has been performed to study the evolution of nonlinear ion acoustic waves and their stability in an unmagnetized plasma. A Gaussian perturbation is used to model the initial localized density perturbation. It is found that the time evolution of such a localized density perturbation evolve into ion acoustic solitons, as predicted by the fluid theory. Issues pertaining to their stability and mutual collisional interaction will be addressed. Possible applications to the electrostatic solitary structures observed in some of the regions of Earth magnetosphere will be discussed.

Keywords: Ion acoustic waves, Electrostatic solitary structures, Fluid Simulation, Ion acoustic solitons, Magnetosphere