

ABSTRACT

TITLE: SOLITONS AND DOUBLE LAYERS IN DIFFERENT TYPES OF PLASMA

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In the thesis, ‘**Solitons and Double Layers in Different Types of Plasma**’ are theoretically studied using standard mathematical methods such as Reductive perturbation method, Pseudo-potential method and Krylov-Bogoliubov-Mitropolsky method. For numerical analysis, we have used softwares like Mathcad, Origin etc. The thesis has two parts: “Solitons in Different Types of Plasma” and “Double layers in Different Types of plasma”.

Part- One (Solitons in Different Types of Plasma):

Chapter- 2: The exact analytical solutions of the nonlinear equations governing the propagation of ion-acoustic solitons in a plasma consisting of warm streaming positive ions and nonthermal electrons has been studied with necessary and sufficient conditions for the existence of ion-acoustic solitons.

Chapter-3: The generation of W-type ion-acoustic solitons has been theoretically studied in a plasma consisting of cold ions and nonthermal electrons. **Chapter-4:** Using the pseudo-potential method, arbitrary amplitude ion-acoustic solitons in an electron-ion-positron plasma has been theoretically investigated. **Chapter-5:** Using the reductive perturbation method, the existence and characteristics of ion-acoustic solitary waves have been studied in a self-gravitating dusty plasma consisting of warm positive ions, weak non-isothermal two-temperature electrons and negatively charged dust particles with charge variation. **Chapter-6:** Using the BKM method, the dressed soliton has been theoretically investigated in dense dusty plasma having ultra-relativistic degenerate plasma consisting of cold inertial ions, degenerate two-temperature electrons and negatively charged dust particles. **Chapter-7:** The effect of the ion beam on the ion-acoustic solitons in unmagnetized quantum plasma has been studied by using the reductive perturbation method. **Chapter-8:** Modulation instability and envelope soliton of high-frequency surface waves on warm plasma half-space have been studied by using multiple scale perturbation.

Part-Two (Double Layers in Different Types of Plasma):

Chapter-9: The effect of boundary of cylindrical wave guide and nonthermal electrons on the ion-acoustic double layers in bounded multicomponent plasma has been theoretically investigated using the pseudo-potential method. **Chapter-10:** The influence of nonthermal electrons and ion beams on the ion-acoustic double layers has been studied using the pseudo-potential method. **Chapter-11:** The effects of positrons and nonthermal electrons on the ion-acoustic double layers in multicomponent plasma with drifting positive and negative ions have been theoretically studied by using the pseudo-potential method. **Chapter-12** The influence of relativistically degenerate electrons

and positrons on the ion-acoustic double layers in warm ion plasma has been theoretically studied by using the pseudo-potential method.

Finally we have summarized the outcome of the thesis.

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