Nonlinear Ion- and Electron-acoustic Waves in Multi-component Plasmas

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Many spacecraft have observed electrostatic solitary waves (ESWs) in the Earth's magnetospheric boundary layers, namely, in the magnetosheath, magnetopause, plasma sheet and polar cap boundary layers, and also on the cusp and auroral field lines. These ESWs have usually bipolar, some times tripolar shapes in the electric field component parallel to the background magnetic field. We discuss a general model for the ion-and electron-acoustic solitons in a multi-component unmagnetized plasma. The model is based on the multi-fluid equations and the Poisson equation, and uses the Sagdeev pseudo-potential techniques to investigate the solitary waves and double layers. Possible applications of this model to the electrostatic solitary waves (ESWs) observed by several spacecraft will be discussed.