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Localized electrostatic solitary structures of small-scale and the distribution of density of the charged in the space plasma

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Recently with use of the experimental technical equipment of high resolution on rockets and sate localized electrostatic structures and nonlinear waves have been registered in various areas of space. Some theoretical models of the formation of the electrostatic solitary structures and the distribution density of the charged particles are calculated analytically and numerically.

Basing on the MHD system equations for three-component plasma, the evolutionary equations dimensional and three-dimensional structures are derived.

It is shown that the order of the non-isothermality of plasma plays a unique role. If for the non-isoth of the first-order the structure is compressive, then for the plasma with the higher-order of non-isoth the solitary structure can be rarefactive or simultaneously compressive and rarefactive. In addition, for plasma parameters, the solitaty wave disappears and double layer is expected.

Some examples of the numerical simulation of the electrostatic structures in the multi-component pla presented for the various regions of the magnetosphere. The results of these theoretical models can be research of experimental data.