

Numerical analysis of electron acoustic dromions in auroral plasma

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Present days' in situ measurements with high resolution, space borne instruments have revealed the existence of multidimensional structures in different regions of space. One such example is the observation of monopolar and bipolar pulses in the auroral region by POLAR and FAST satellites. This has triggered lots of interest among the space plasma physicists. Whereas the previously observed one-dimensional localized structures have been successfully modeled by the solitary wave theory, its direct extension to two-dimensional model is found to have its own limitations. The authors have proposed *dromions* as a possible model for multidimensional waves. Dromions are exponentially localized structures in two dimensions which are characterized by time dependent boundary conditions. They appear as a solution of a class of nonlinear partial differential equations. In a previous work, it has been shown that the nonlinear evolution of a two dimensional electron acoustic wave are governed by Davey-Stewartson - I (DS-I) equations which may lead to dromion solutions. The analytical solutions are found to be restricted in the parameter space and a numerical algorithm thus become necessary to develop a more general and realistic model. In the present work, the authors are intended to investigate the initial value problem of the DS-I equations under non trivial boundary conditions which are the same as those of the one dromion solution. The plasma parameters are chosen to be consistent of the auroral plasma and dromion solutions are obtained using fluid simulations. The effect of different plasma parameters on the generation and stability of dromions will be studied numerically.