Solitons and Double Layers in Magnetospheric Plasmas

S.V. Singh¹, G.S. Lakhina¹ and R. Bharuthram²

¹Indian Institute of Geomagnetism, New Panvel (West) Navi Mumbai-410218, India ²University of the Western Cape, Modderdam Road, Belville 7530, South Africa E-mail:satyavir@iigs.iigm.res.in

Solitons and double layers have been observed by satellites in the different regions of the Earth's magnetosphere. These structures are found to be having both positive and negative electrostatic potentials. Arbitrary amplitude theory of electrostatic solitary waves and double layers is developed in an unmagnetized plasma consisting of nonthermally distributed electrons, fluid cold electrons, electron beam and ions. The amplitude, velocity and width associated with these nonlinear structures are numerically obtained and are compared with the satellite observations in the Earth's magnetosphere. A parameter regime for both solitons and double layers is obtained.