EXISTENCE OF DOUBLE LAYERS OR SHOCKS IN THE AURORAL REGION WITH HPT ELECTRON DRIFT.

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Excitation of waves in plasma by magnetic field aligned current sheet is a subject of great importance to plasma physics. In particular, double layers are believed to play a significant role in the excitation of waves and acceleration of electrons over auroral region. A double layer is an electrostatic structure which can appear within current carrying plasma and sustain a significant net potential difference. The studies on field aligned current density (FAC) and potential formation on dipole type of geomagnetic field reveal that auroral double layers or shocks are a consequence of imperfect magnetosphere- ionosphere coupling following an enhancement of magnetospheric convection and parallel electric fields. As the parallel potential drop over the double layer increases, the FAC increases and its magnitude depends on ionospheric altitude at which the double layer is formed. The FAC regions coexist with enhanced precipitation of hot plasma torus (HPT) particles (energy 1-10 keV) having several degrees of latitude in width in the auroral oval region. The present study deals with the potential formation and FAC in the dipole field leading to the formation of double layer and the instabilities associated with the double layer leading to the auroral arc deformation. The drift velocity of HPT electron is obtained from FAC density and is larger than the electron thermal velocity and temperature is much larger than the ion temperature. FAC density is computed by using high time perturbation magnetic field data of spacecraft. Also the detailed analysis of parallel potential drop, width of the double layers or shocks and growth rate of instability in the auroral region will be discussed.