

Strong electric field irregularities adjacent to the convection reversal boundaries

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Strong electric field irregularities adjacent to the convection reversal boundaries (CRBs) have been revealed from the high resolution ionospheric electric field measurements of the Dynamic Explorer 2 spacecraft. The irregularities seem to be an intrinsic feature of the CRBs, since they were detected nearly in all the satellite pathes over the observational period of 540 days. Scale size of the irregularities varied from 5km to 50 km, the electric field in the peaks reaching 100 – 200 mV/m. with maximum values in the dawn sector of MLT. Some asymmetry of the fluctuation profiles was observed, the poleward edges being steeper and equatorward ones smoother for the dusk sector and opposite relation for the dawn MLT. Comparison of the irregularities morphology with the conditions in the solar wind indicates that the fluctuations develop more readily under strong positive (northern) B_z IMF and high velocities of the solar wind. Their dependence on any other solar wind parameters, e.g. B_x , B_y IMF, RMS, n , p , etc. was found to be weak.

In several cases it appeared possible to establish the conjugancy of the events for the northern and southern hemispheres which proves their attachment to the closed magnetic field lines.

Some speculations have been made concerning the nature of the phenomenon discovered and its relevance to the magnetospheric high velocity streams and ionospheric auroral arcs. It's suggested that the irregular electric fields could reflect some random processes in the quasi-viscous layer, but more probable they are a manifestation of some instability developing at the CRBs in the magnetosphere.