EXPERIMENTAL EVIDENCE FOR MULTI-LEAVED CLOVER FEATURES OF THE FLOW ANGLE ANISOTROPY OF 1-M AURORAL IRREGULARITIES

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Characteristics of the diffuse radar aurora (RA) echo power registered by the STARE radars over Tromso are analyzed as a function of the ionospheric electric field and electron density in the RA layer measured by the EISCAT facility. About 75 hours of EISCAT data with a time resolution varying between 30 and 180 seconds obtained during the ERRIS campaign in 1988-89 are used in the analysis.

The square root of the backscatter volume cross section divided by the mean electron density is used as an estimate of the rms electron density fluctuations assumed to be proportional to the turbulence level intensity of the 1-m plasma waves responsible for the RA echo.

The follows flow angle patterns (an angle between the direction of the radar beam and that of the Hall current in the backscatter ionospheric area) of 1-m auroral irregularities are found:

1) For the 5-30mV/m E-field interval, the flow angle anisotropy can roughly be described as a three-leaved or four-leaved clover.

2) The main minimum of the flow angle diagram observed in the plane perpendicular to the geomagnetic field vector is for 75-90 deg interval.

3) For larger E-field values (within the interval), the minima of the plasma wave turbulence level have a tendency to be observed at large flow angles. This is interpreted as a widening of the cone of the primary irregularity generation. The widening is 15-25 deg when the mean E-field strength increases from 15 to 25 mV/m.

It is concluded that the gradient-drift (GD) mechanism is important in the generation of 1-m auroral irregularities at least for 5-20 mV/m E-field strength interval. For 20-30 mV/m, the flow angle anisotropy can be interpreted theoretically.