The structure of the ionospheric Alfvén resonance in observations of natural magnetic field

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Abstract

Observations of the N-S magnetic component of natural electromagnetic noise are used to study the spectral resonance structure (SRS). The spectral resonance structure is believed to appear due to the ionospheric Alfvén resonance (IAR) and to reflect the structure of the resonance. The measurements have been run in the Bieszczady Mountains in Poland by the Schumann Resonance Group from Astronomical Observatory of the Jagiellonian University. Since 1996 to 2003 there have been collected about eighty 24-hour observations. Averaged power spectra in the range 0.5 - 3.5 Hz are analyzed numerically to detect the spectral resonance structure and to estimate its frequency scale. The structure is seen at local night usually on days of very low geomagnetic activity.

An algorithm of evaluating the SRS frequency scale $\Delta f$, constructed in the basis of a simple analytical model of IAR, is used. The algorithm is applied to 11 of 80 observation days, when the structure appeared. Diurnal variations of the scale $\Delta f$ are shown. Averaged values of $\Delta f$ are 0.4 - 0.5 Hz for the spring and summer observations and 0.6 - 0.7 Hz for the autumn observations. The higher values correspond to the structures in years of lower solar activity. The observed values of the SRS frequency scale are compared with the values estimated with the International Reference Ionosphere model. The values obtained with the IRI model seem to overestimate the observed ones.