Geomagnetic Pi2 pulsations and related ionospheric oscillations measured by Doppler sounding

J. Chum (1), Hruska (1) , D. Buresova (1), T. Sindelarova(1), P. Hejda (2) , J. Bochnicek (2)

(1) Institute of Atmospheric Physics, Czech Republic, Prague, (2) Geophysical Institute, Czech Republic, Prague (contact email: jachu@ufa.cas.cz)

In 2004, we started operating a continuous Doppler sounding of the ionosphere to investigate infrasonic, short period acoustic gravity waves and geomagnetic pulsations in the ionosphere. Since January 2007, four stable 3.59 MHz transmitters have been in operation in the western part of the Czech Republic. Multipoint measurements enable us to investigate horizontal propagation of disturbances and waves in the ionosphere and to estimate horizontal distances at which these disturbances (waves) are correlated. We show that ionospheric oscillations caused by Pi2 geomagnetic pulsations having periods ˜1-3 minutes occur simultaneously (within the precision of the measurements) on all Doppler sounding signals. We perform the cross-correlations of the Doppler signal with the fluctuations of the geomagnetic field measured on the ground at the observatory of Budkov. The sounding signals (Doppler records) are usually best correlated with the variations of the horizontal components of the geomagnetic field. Often, a good correlation with the variations of the magnetic field amplitude is also observed. The observed geomagnetic pulsations are predominantly left-handed with an elliptical or nearly linear polarisation. In one case, we have also observed right-handed pulsations. Our observations show that the phase shifts between geomagnetic components and Doppler shift signals can change case from to case. We note that, mainly during the day time conditions, we observed many strong geomagnetic pulsations which had no response in the Doppler shift signals.