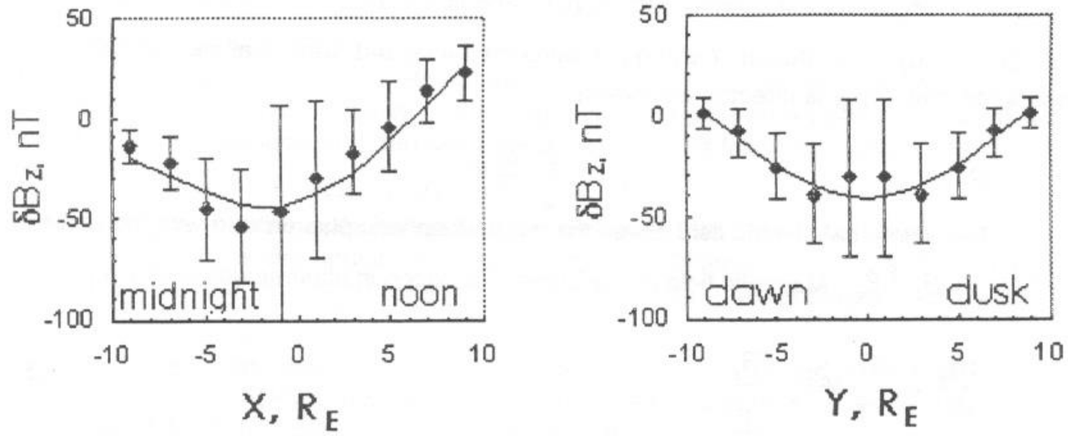
Dst AND *p*-DEPENDENT MODEL OF MAGNETIC FIELD IN THE EQUATORIAL PLANE OF THE INNER MAGNETOSPHERE

A.A.Ostapenko, Yu.P.Maltsev, M.V.Malkov *(Polar Geophysical Institute, Apatity)*

More than 2000 magnetic field measurements in the disk region $r < 10\ R_E$, $|\ z\ | < 2\ R_E$ were used for constructing the empirical magnetic field model. In the figure, points with dispersion bars show two averaged profiles of the magnetic field of magnetospheric sources, one for the noon-midnight meridian, the other for the dawn-dusk meridian. Solid



lines present the approximation by the polynomial of the fourth order

$$\delta B_z = s_0 + s_1\,(x^2 + y^2) + s_2\,(x^2 + y^2)^2 + a_1\,x$$

where s_0, s_1, and s_2 are the coefficients of the azimuthally symmetrical part, a_1 is the coefficient of the first azimuthally asymmetrical harmonic. We have examined how the coefficients depend on the *Dst*-index, solar wind dynamic pressure *p*, and *z*-component of the IMF. The dependence on the IMF appeared not to be essential. The coefficients s_0 and s_1 depend mainly on *Dst*. The coefficient a_1 appeared to depend only on *p*. Expressing δB_z and *Dst* in nT, *p* in nPa, *x* and *y* in earth radii, we obtain

$s_0 = -27 + 1.0\,Dst$, $\quad s_1 = 0.63 - 0.022\,Dst$,

$s_2 = -3.8{\cdot}10^{-3} + 1.2{\cdot}10^{-4}\,Dst + 4.1{\cdot}10^{-4}\,p$, $\quad a_1 = 1.90\,p^{0.60}$.

Average values of *Dst* and *p* in the data set were -16 nT and 2.2 nPa respectively. Both the figure and the coefficient s_0 show rather severe magnetic depression in the inner magnetosphere even during quiet periods.

Note that the Mead calculations predict $a_1 \approx 0.94\ p^{2/3}$. The empirical coefficient is about twice this value, probably due to the influence of the cross-tail current.

The model provides the residual error 44% which is essentially smaller than the error in other models depending on *Kp* and IMF.

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