ON ORIENTATION OF THE MAGNETIC DIPOLE OF MARS

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The magnetic dipole axis of Mars is inclined to the rotation axis at the angle of about 15°. The north pole of the dipole is situated in the southern hemisphere of the planet.

These conclusions are based on the additional analyses of magnetograms of the radial field components measured on the night and on the day side of the planet.

In [1,2] it was suggested that during the measurements on 20.02.74, "Mars-5" satellite crossed the southern (2'-2) and the northern (2+3) field line bundles of the martian magnetospheric tail and the neutral layer zone (Fig.1a).

During the measurements on 15.02.74 (Fig.1b), the southern bundle of the magnetic tail (2'-2) was identified from characteristic plasma properties. On magnetometer, its direction coincided with the direction of IMF radial component (from the Sun), which made difficult the identification from magnetic field data.

Thus, the magnetograms from "Mars-5" show that the northern magnetic pole of the dipole is situated in the southern hemisphere of the planet.

Fig.2 represents the co-ordinates of the points in which the radial field components B measured in different seances changed the sign, passing through zero. The curve connects these points is analogous to the equator of the magnetic dipole with the axis inclined to the rotation axis at ~ 15°.

The right-hand side of Fig.3a,b,c shows the mutual position of the magnetic and areacentrical equators on the day side in the above seances and the model undisturbed field line, corresponding to the dipole polarity from "Mars-5" data.

In the seance of 12.05.72 (Fig.3a) the satellite reached the magnetosphere over the ecliptic and the reversal of Bx agrees with the topology of undisturbed field line.

In the seances of 8.01. and 21.01.72 (Fig.3b,c) the magnetosphere was reached under the ecliptic at the mutual position of the magnetic and areacentrical equators opposite to that in the seance of 12.05.72. The reversals of Bx in Fig. 3b,c are analogous and contradict to the topology of the undisturbed field line from "Mars-5" data.

Thus, the measurements on 21.01.72 ("Mars-3") were made in the region of distorted field, which provided the positive sign of Gaussian coefficient g°. Assumption that "... the external magnetic field sources could change the numerical value of g°, but not its sign" [2] provided the conclusion about the opposite polarity of the martian and Earth's dipoles.

The totality of data infers that the martian dipole polarity is analogous to the polarity of the Earth's dipole. More
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details concerning the experiments and the state of the problem in general are given in [3].

References

Table

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<th>Satellite</th>
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Fig. 1 a, b

Fig. 2

Comment: see the Table.

Fig. 3 a, b, c

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