Investigation of the magnetospheric convection influence on equatorial electrojet and electric field at the geomagnetic equator in quiet conditions on the basis of the GSM TIP

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Inclusion in the Global Self-consistent Model of the Thermosphere, Ionosphere and Protonosphere (GSM TIP), developed in WD IZMIRAN, of the new block of the electric field calculation allows to carry out the investigation of the equatorial ionosphere. In this block the decision of the three-dimensional equation of the full current density conservation in the ionosphere of the Earth is realized by adduction it to the two-dimensional by integration on thickness of the current conductive layer along geomagnetic field lines, which are expected equipotential.

In the given work are presented the calculation results on the basis of the model GSM TIP, in which the composition and the temperature of neutral atmosphere computed on the basis of model MSIS. The calculations were carried out for the quiet equinox conditions in the minimum of the solar activity. The magnetosphere convection field calculated in the model by two ways paid in models - by setting of the field aligned currents of the first zone or potential difference across the polar caps. Herewith in the first variant of calculations the currents of the first zone were selected so as got the potential difference through the polar caps was approximately such, as assigned in the second variant. There are considered two events - an absence of the screening by Alfven layer electric field that is to say the absence of the field aligned currents of the second zone, and presence of such screening under given field aligned currents of the second zone. All calculations were carried out with taking into account of the dynamo field, generated by thermospheric winds moreover we had the possibility to compare the got calculation results with calculation results, executed with taking into account for only the dynamo field.

There are shown the calculated global distributions of the electric field potential of the dynamo and two variants of the full field disregarding and with taking into account for screening, corresponding to them the global distributions of the linear density of the zonal current, unrolling on UT of the east component of the electric field, critical frequency and height of the F2-layer maximum, calculated for all these variants on the station Jicamarca and vertical profiles of N_e on this station for the different moments

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UT.

The conclusion is done about that that in quiet geomagnetic conditions in absence of the screening the magnetospheric convection field penetrates to the geomagnetic equator, intensifying both field and equatorial electrojet. The screening weakens the influence of the magnetospheric convection on the equatorial electric field and equatorial electrojet, which in this case are defined by the dynamo field. There are some differences in equatorial effects of magnetospheric convection, calculated under given field aligned currents of the first zone and potential difference through polar caps. It is shown that the calculated in model electric field capable to bring about the stratification of the F2-layer of the equatorial ionosphere and F3-layer formation. Besides, the ions H^+ form on height $\sim$1000 km the G-layer due to meridional wind component of the global thermospheric circulation.