1.11 ST

Temporal Polar Cap Radiation Belts on Dayside Magnetosphere

Pugacheva, G. I.[1], Gusev, A. A.[2], Jayanthi, U. B.[2], Schuch, N. J.[3], Spjeldvik, W. N.[4]

[1]*Divisão de Astrofisica (DAS) - Instituto Nacional de Pesquisas Espaciais (INPE) - Av. dos Astronautas, 1758 - Caixa Postal:515 - Cep.:12227-010 São José dos Campos - S.P. - Brasil,*
[2]*Divisão de Geofisica Espacial (DGE) - Instituto Nacional de Pesquisas Espaciais (INPE) - Av. dos Astronautas, 1758 - Caixa Postal:515 - Cep.:12227-010 São José dos Campos - S.P. - Brasil,*
[3]*Southern Regional Space Research Center/Instituto Nacional de Pesquisas Espaciais (INPE) - Santa Maria - R.S. - Brasil,*
[4]*3Weber State University, Ogden, Utah, USA*

The possibility of quasi-stable trapping of charged particles of hundreds keV to MeV energy on the front side Earth magnetosphere in high latitudes is explored in this presentation by numerical modeling of the single particle orbits in the geomagnetic field utilizing empirical Tsyganenko model. On the front side magnetosphere the remote equatorial magnetic field lines are compressed to balance the solar wind pressure and exhibit two minima in the geomagnetic field strength magnitude along the field line in high latitudes on both sides of the equator which results in stable confinement structures in the north or/and the south hemispheres, providing energetic particle trapping for times from several minutes to durations of seasonal scale. Simulation the energetic charged particle orbits in magnetosphere passing through the regions of magnetic field minima with different disturbance level and the Earth's tilt shows when and where these trapped radiation zones could situate. It is noted that the existence of this adiabatic confinement zones depends on the tilt. As a result the northern polar cap (cusp) confinement zone appears only during a summer solstice and similarly the southern hemisphere capture zone appears only during a winter solstice. Thus during solstices the zone exists only in one hemisphere and is absent in the opposite one. During equinox times the confinement zones exist in both hemisphere in the disturbed magnetospheric conditions, however, they are less pronounced. The zones are essentially restricted to the sunlit side of the magnetosphere. They form a kind of polar cap radiation ring/belt, where a particle drifts with a period of the several minutes, conserving its 1st and the 2nd adiabatic invariants. The latitudinal width of the ring is very thin, about 2-5 latitudinal degrees. The particles orbits passing through opposite off-equatorial field minimum reveal another interesting effect: a bound of the geomagnetic equatorial plane on the day sector. These and other features of the confinement zones in the two minima off-equatorial magnetic field regions are discussed.

Keywords: **magnetosphere**, **radiation Belt**, **cusp region**, **adiabatic invariant**, **solstice**, **equinox**

Corresponding author's e-mail: galina@das.inpe.br