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Phenomena of trend, annual and semiannual variations of latitude position of the latitudinal circles of the Earth

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The new astrometry phenomenon – displacements of latitudinal circles (connected with its spherical surface) caused by deformations of the Earth surface. This phenomenon is a dynamical consequence of the small relative polar motions of the core relatively to the mantle of the Earth. The phenomenon of translation of latitudinal circles (in parallel plane) of the corresponding parallels with simultaneous change of their radius is characterized directly by polar (and not only polar) displacements of the centre of mass of the Earth (Barkin, 2002). This phenomenon is expressed in the definite variations of angular distances of latitudinal circles from the unperturbed position of equator circle. The dynamic research of deformations of a surface of the Earth due to relative displacement of the core and the mantle of the Earth (Barkin, 2002; Barkin, Shatina, 2005) and the data of satellite observations (Blewitt et al., 2001) has shown that the latitude **Q** of latitudinal circle (relatively to its unperturbed position on the sphere of the Earth) varies under the law **dQ=[26.7 t+44.3cos (V) +10.0cos (W)] cosQ**, where amplitudes are given in micro seconds of arc (Ms), velocity of trend in Ms/yr, the time t is measured in years (from the beginning of year), and arguments **V** and **W** are measured in degrees and calculated under formulas **V=360 t-56** and **W = 720 t-207**. Thus, angular distances between any from two latitudinal circles on surfaces of the Earth vary cyclically with annual, semi-annual, and generally and with other periods, and test secular drift (Barkin, 2005). Figuratively speaking the original phenomenon of “ wrinkling of the Earth surface” is a process of cyclic changes of its "mimicry" and “ general sading”. The trend of latitudinal circles occurs on a direction of the core trend (in considered model to the North Pole). The velocity of trend is proportional to the sine of latitude. The equator circle tests maximal annual displacement (in March it is displaced on 44.3 Ms to the North, and in August - September

on as much to the South). At Moscow latitude the similar displacement are characterized by amplitude 24.4 Ms. Quantitative evaluations of variations of angular distances between any two from latitudinal circles and linear distances between two stations of observations, including located on one meridian have been obtained. So between the stations located at latitudes (degrees) 30 and 90 in northern hemisphere the length of the base line tests the annual oscillation with amplitude of 3.4 mm and small trend with velocity 2.1 mm / yr. The data of the spectral analysis of temporal series of coordinates of geocenter on DORIS observations (Tatevian et al., 2004) specify existence of other cyclicities in variations of latitudinal circles. On the basis of developed geodynamic model (Barkin, 2002) we obtain that other possible variations of latitudes of latitudinal circles with significant amplitudes can be observed: with amplitude 74 Ms (with period about 2.1-2.3 yr); 70 Ms (3.6-3.8 yr); 103 Ms (the period of 7.5-8.0 yr); 70 Ms (471 days); 65 Ms (1.6 yr); 50 Ms (the period 6.9 days).

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