

# Translatory - rotary motion of the planet as new approach to solution of astronomical problems of the theory of the Earth rotation

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In a basis of many astronomical researches the dynamic theory of rotation of the Earth relatively to its center of mass lays. At studying of the Earth rotation, as a rule, its orbital motion around of the Sun and rather baricenter of the Earth-moon and rotary motion are considered independently. I.e. formally the equations of rotary motion are investigated independently after construction of the corresponding theory of orbital motion of planet.

From the dynamic point of view such approach well enough reflects the general motion of the Earth in space. However, data of observations and measurements (IERS) [1] in research of poles of the Earth have shown, that within the limits of such approach it was not possible to promote in understanding of mechanisms of excitation of the basic component of oscillatory motion of poles – Chandler component.

In our opinion, the modern level of accuracy of determination of parameters of rotation of the Earth leads to necessity of elimination of some simplifications in the accepted theory of rotary motion of the Earth. The general statement of a problem at studying such thin dynamic effects as free nutation of axis of the Earth rotation and changes of latitudes is represented expedient more at construction of the precision theory of rotary motion of the deformable Earth. The celestial-mechanical

model including consideration of the Earth as an elastic celestial body with dissipation of energy at deformations, making progress-rotary in the Earth-Moon in a gravitational field of an attraction of the Sun is offered. On the basis of model of the viscoelastic body close to axisymmetric forced oscillations of a pole of the Earth have been investigated. It is established, that Chandler and annual components of discussed oscillations have the celestial-mechanical nature and are caused by gravitational tidal influence of the Sun and the Moon.

The analysis of a trajectory of a pole and the forecast of its motion represent significant interest in its natural-scientific and applied aspects. The construction of precision theoretical model of rotation of the deformable Earth, identification of its parameters on bases of data of measurements IERS and the reliable forecast of motion of a pole are rather important at the decision of problems of navigation on enough long for practical purposes intervals of time and at researches of some astronomical, geodynamic and geophysical problems.

## References

[1] IERS annual reports. 1990 July 1991 bis 1999 July 2000. Central Bureau of IERS. Observatoire de Paris. 2000 July 2001 bis 2002 July 2003. Verlag BKG Frankfurt am Main.