



## **Virial-based theory of the Earth global dynamics, gravity and electromagnetic field change**

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The virial-based dynamical approach was applied for solution of the problem of the Earth global dynamics. The reasons to reconsider traditional approach based on the hydrostatics and the idea of inertial rotation of the planet are as follows. Recent satellite measurements of zonal and tesseral gravitational moments demonstrate that the Earth doesn't stay in hydrostatic equilibrium. The potential energy  $U$  of the Earth by about three orders exceeds the kinetic energy  $K$ . That contradicts to the fundamental relation  $|U|=2|K|$  of the virial theorem. Application of the virial theorem in its averaged ( $U + 2K = 0$ ) and nonaveraged ( $\ddot{\Phi} = U + 2K$ , where  $\Phi$  is Jacoby function) form made it possible to solve the problem on the bases of dynamical equilibrium of the body state.

The obtained solution gives periodic change of the moment of inertia or the potential (kinetic) energy of the Earth's shells. It determines the planet's oscillation, rotation and precession. The outer force field of the Sun and the Moon only perturbs the above motions. The nature of wobbling (nutation) of the planet's axis (outer shell) appears to be an effect of three-dimension radial structure of mass and outer force field of the interacted bodies. The effect develops in order to keep spatial dynamical equilibrium at the bodies axial and orbital motion. Chandler's wobble becomes here also understood.

Being dependant on radial density distribution, the values of oscillation frequencies

and angular velocities of the body shells are different. For instance, it appears, the observed period  $T \cong 24h$  of the Earth rotation attributes to the outer shell up to Moho discontinuity ( $\sim 375 \text{ km}$ ), but not to whole planet. Mechanism of the Earth's shell separation and some other dynamical effects are discussed in the work.

It was found that electromagnetic energy of the Earth is a inherent part of energy of the mass interaction. The virial oscillations of a celestial body appears to be mechanism of the electromagnetic energy generation. In fact, gravitational and electromagnetic energies are interconvertible on atomic level by means of quantum mechanism of emission and absorption of radiation.

Global dynamics of the Earth and its gravitational and electromagnetic field change are interconnected and interdependent components of the common dynamical process of the planet.

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