DRIVING MECHANISMS OF DEEP GEODYNAMIC PROCESSES

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Summary Deep geodynamics is determined by the spatial movement of the Earth: rotation around its own axis and orbital revolution around the Sun in the Newtonian gravitational field interactions Moon, the Sun and the planets of the Solar System. These interactions are the external forces of cosmic origin. The forces of inertia rotation of the Earth, along with the forces of interaction between the inner layers and temperature gradients, apply to internal body forces. Taking into account forces operating to the Earth driving mechanisms of deep geodynamic processes are constructed.

INTRODUCTION

In Kazakhstan, many problems in the mechanics of the Earth in its unified interpretation set by academician Zh.S.Erzhanov and solved by his pupils [1-6]. In researches of deep geodynamics to the fore a problem with the study of the structure and the processes occurring in the boundary between the mantle and the core layer [7]. The mechanism of interaction between the internal and external layers of the Earth is based on the dynamics of the Earth's axial rotation. Influences of endogenous processes apply to all external covers of the Earth. Geodynamo generates the Earth's outer core magnetic field covers the entire planet. Uneven rotation of the inner solid core, caused by external factors, manifested in the relief and seismicity of the Earth. The greatest influence on the Earth has a moon. The gravitational effect of the sun is also one of the reasons for the solid tides, although on a smaller scale than the moon.

LAYERED VISCOELASTIC MECHANICS OF THE EARTH

Layered viscoelastic mechanics of the Earth where the source of its dynamic development, the force of inertia of the internal asynchronous rotation and viscous forces from the spherical Couette flow in the liquid layers is constructed. These forces determine the nature of the internal geodynamic pressure and tangential tensions. It was found that depending on the difference between the angular velocities of the inner covers Earth can be under full compression or expansion.

BIFURCATION VIBRATIONS DILATED MODEL OF THE EARTH

The dynamic buckling vibrations dilated model of the Earth, rotating in a force field due to the moon and the sun were investigated. The main subcritical stress-strain state of the model of the Earth was found. Determined the disturbance associated with fluctuations in the bifurcation model of the Earth. Were derived the boundary conditions for the stability of oscillation. Were abstracted the frequency of bifurcation oscillations dilated model of the Earth. Was found a measure of the dynamic susceptibility, depending on the frequency of the bifurcation of oscillations and the observed frequency of free oscillations, which provides resonance phenomenon.

MECHANISM OF LOCAL CHANGES LITHOSPHERE THICKNESS

The mechanism of local changes of thickness of a lithosphere as a result of instability of deformation of an ellipsoidal lithosphere cover of the Earth under the influence of the internal pressure and volume forces of inertia of rotation was founded (Fig.1). Stability of deformation was investigated by a Leybenzon-Ishlinsky method. The main stress and strain state is considered in the same form the boundaries of the body, and in view of the disturbed elements turns the borders of the body in the process of transition to a related form of equilibrium. Was determined the asymmetric form of disturbances that lead to loss of stability of an ellipsoid of revolution. There is an exponential growth of perturbations of components in time, accompanied by vibration changes.

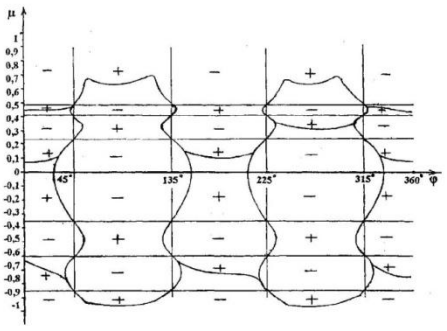

Fig. 1. Lines of the maximum thinning

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DYNAMICS OF EARTH'S INNER CORE

The dynamics of the Earth's inner core, taking into account the forces of viscous resistance of the outer core and its own gravitational force was examined. Studied the oscillatory motion of the inner core on a small time interval in its own gravitational field. Investigated the damping of the amplitude of the vibration motion of the inner core to the large time interval in its own gravitational field (Fig.2). The conclusion was that the core has the property of eccentricity. The motion of the inner core of the Earth in case of registration of the geomagnetic field was investigated. Was concluded about the smallness of the magnetic field effect on the overall picture of the inner core. Investigated the oscillatory motion of the inner core of the Earth in a Newtonian field of external center of attraction. Founded influence the mechanical properties of the core and the outer center of attraction in its oscillatory mode. As an example, consider the gravity field of the Moon and the Sun's gravity field.

Fig. 2. Fluctuations of the inner core on time intervals of two periods and 120 days

MECHANICS DEEP SALT DIAPIRISM

Based on the model Rayleigh-Taylor instability in the Boussinesq approximation with an exponential dependence of viscosity on temperature is developed and justified a numerical model of the formation of the salt diapirs at great depths the Earth's interior. Then conducted numerical simulation allowed us to estimate the basic parameters, patterns and characteristics of the nonlinear stage of the formation of the deep salt diapirism. The carried-out then numerical modeling allowed to estimating key parameters, regularities and features of a nonlinear stage of process of formation of a deep salt diapirism (Fig.3). Was suggested method of estimating the possible areas of oil and gas traps. It has been shown that hydrocarbon reservoirs are attached to areas of high temperature gradients.

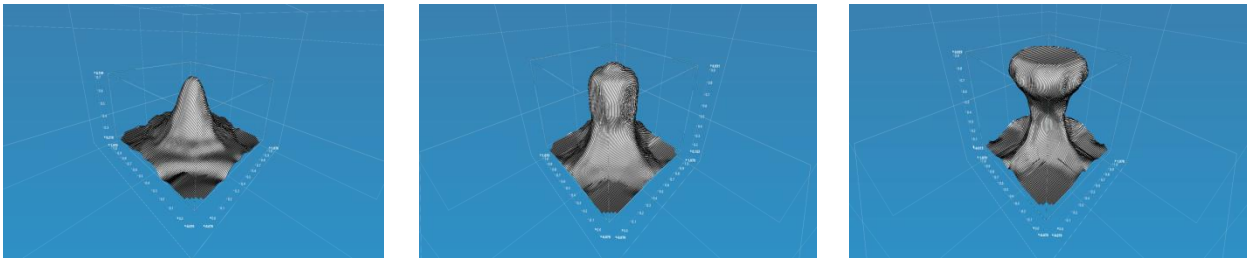

Fig. 3. Spatial profiles of a deep salt diapirism in various time points

CONCLUSION

Described driving mechanisms complement a wide class of models of the motion of matter in the subsoil of the Earth, the mechanism of the dynamic interaction of the components of the Earth in close connection with the evolution of the Earth's interior tasks during the period of formation and development of Earth.

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