



Numerical Results of Earth's Core Accumulation 3-D Modelling

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For a long time as a most convenient had been the model of mega impact in which the early forming of the Earth's core and mantle had been the consequence of formed protoplanet collision with the body of Mercurial mass. But all dynamical models of the Earth's accumulation and the estimations after the Pb-Pb system, lead to the conclusion that the duration of the planet accumulation was about 1 milliard years. But isotopic results after the W-Hf system testify about a very early (5-10) million years, dividing of the geochemical reservoirs of the core and mantle. In [1,3] it is shown, that the account of energy dissipating by the decay of short living radioactive elements and first of all Al, it is sufficient for heating even small bodies with dimensions about (50-100) km up to the iron melting temperature and can be realized a principal new differentiation mechanism. The inner parts of the melted preplanets can join and they are mainly of iron content, but the cold silicate fragments return to the supply zone. Only after the increasing of the gravitational radius, the growing area of the future core can save also the silicate envelope fragments.

All existing dynamical accumulation models are constructed by using a spherical-symmetrical model. Hence for understanding the further planet evolution it is significant to trace the origin and evolution of heterogeneities, which occur on the planet accumulation stage. In that paper we are modeling distributions of temperature, pressure, velocity of matter flowing in a block of 3D- spherical body with a growing radius. The boundary problem is solved by the finite-difference method for the system of equations, which include equations which describe the process of accumulation, the Safronov equation, the equation of impulse balance, equation Navier-Stocks, equation for above litho static pressure and heat conductivity in velocity-pressure variables using the Businessque approach. The numerical algorithm of the problem solution in velocity-pressure variables is constructed on the base of the splitting method. The velocity field and pressure field we obtain using the checkerboard grid. The occurring and evolution of the initial heterogeneities in the growing planets is caused by heterogeneous distribution of falling accumulated bodies.

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