



## **Accumulation of planets into the proto-planetary cloud as a process of occurring an amount of characteristic scales into the nonlinear self organized dynamical systems**

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Two characteristic times are significant for evolution the interior of the homogeneous proto-planetary cloud: the time of bodies free fall towards the clouds mass center and the time of sound distribution through the cloud. With the beginning of proto-planetary disk fragmentation and accumulation of the proto-planets from the bodies and particles there are formed matter content heterogeneities of the finite dimension, heterogeneities of temperature, density and values of kinetic coefficients. The system became more and more complicated with interior interconnections. By the growing of the bodies the difference between the values of the characteristic times and dimensions become larger. The dynamical evolution of the system we could observe with use the numerical modeling of the Earth and Moon formation into the 3-D model [1,2]. The fact, that the linear dimensions of the objects during the accumulation process change from the centimeter and meter dimensions to some thousands of kilometers significantly prevent the mathematical description of these processes. The corresponding values of the no dimensional similarity criterions, which are included into the systems of differential equations, which describe the proto-planetary growing, the conditions for entropy and mass on the growing surface, the equations of the impulse balance, energy and mass into the interior parts of the planet change on an orders of values. Therefore we used very detailed space and time grids for solution the problem using the method of finite differences. The additional complications occur according to necessity to take into account the nonlinear dependence of matter viscosity from the temperature, pressure and chemical matter content. At last we took into account the principal random distribution of heterogeneities, stipulated by bodies and particles falling. Only progression towards that direction and constructing corresponding systems of observation and interpretation allow to hope receiving more and more realistic models of self organizing structures and to understand the laws of their reconstruction during the complicated process of planetary accumulation. The work is fulfilled by partly support of RFBR (grant N13-05-00138).

References.

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