

# ACKNOWLEDGEMENT OF HYPOTHESIS O.J. SHMITH ABOUT THE NATURE

## OF THE FIRM NUCLEUS OF PLANETS-GIANTS

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Half-centuries back O.J. Shmidt has stated an idea [1], that the planets-giants have in its centre the firm nucleus similar to planets of terrestrial group. The given assumption today receives full acknowledgement [2].

In tab.1 parameters of HCl-nucleus and external convection environments of planet-giants are compared according to two calculation. The first calculation is the data of physical modeling of an internal structure of planets: Jove, Saturn, Uranus and Neptune with use of strict mathematical models [3, 4]. The second calculation is based on hypothesis that formation of these planets according to the new cosmogonies concept "cosmogony of open Solar system (COSS)" occurred into two stages [5]. The second stage was caused by destruction of the planet Phaeton [2].

**Table 1**

### INTERNAL STRUCTURE AND COMPOSITION OF PLANETS-GIANTS

| Basic parameters                          | Jove                            |       | Saturn                           |       | Uranus             |       | Neptune            |       |
|-------------------------------------------|---------------------------------|-------|----------------------------------|-------|--------------------|-------|--------------------|-------|
|                                           | [3]                             | tab.2 | [3]                              | tab.2 | [4]                | tab.2 | [4]                | tab.2 |
| Mass of HCl-nucleus                       | 5.0                             | 4.1   | 5.7                              | 6.7   | 13.72              | 11.84 | 16.56              | 17.07 |
|                                           | 18 %                            |       | 17.5 %                           |       | 15 %               |       | 3 %                |       |
| Mass of environment                       | 312.8                           | 313.7 | 89.3                             | 88.4  | 0.88               | 2.76  | 0.51               | 0     |
|                                           | 0.3 %                           |       | 1.0 %                            |       | –                  |       | –                  |       |
| Components composition of environment (%) | HC - 3.7<br>I - 16.0<br>G- 80.3 |       | HC – 1.4<br>I – 24.0<br>G – 74.6 |       | HCl - 10<br>G – 90 |       | HCl – 10<br>G – 90 |       |

HC – hard component, I – ice, G – gases. All masses expressed in terms of the Earth mass. Divergences of both calculations are specified in %.

### 1. Physical and mathematical modelling

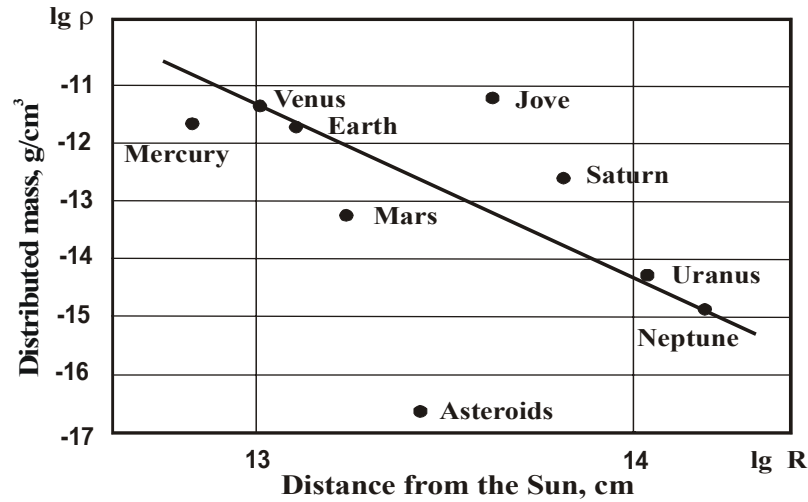
Models of the Jove, Saturn, Uranus and Neptune [3, 4] are constructed in such a manner that satisfy parameters of this planets known from supervision: to their radiuses, the axial rotation periods, and also the second and fourth gravitational moments. From these models follows, that planet-giants as a minimum have two layers. They consist of the central hard nucleus and convecting external gas-liquid environment. Together with gases H<sub>2</sub>, He, Ne etc. (G-component) the material of planets necessarily should include some of ice of substances of average evaporation ability H<sub>2</sub>O, CH<sub>4</sub>, NH<sub>3</sub> etc. (I-component), and also heavy evaporating substance mainly presented by oxides Si, Mg, Fe, not oxidised iron and Fe-Ni alloy (HC-component). Depending on temperature of hardening of these substances, composition and a ratio of ice and gas in planets environment can be variable, and the central nucleus will contain different quantity I-components.

Physical models of planets-giants testify, that the HC-substance besides the central nucleus should be present at an absent-minded kind and in a gas-ice environment. At transition from the Jove to Saturn and further to Uranus and the Neptune the mass of the central nucleus and its share in mass of planets steadily grow, and the contents of HC-material in an environment has reducing.

### 2. Calculation on basis COSS

Concept COSS supposes, that the belt of asteroids appeared owing to the destruction of the Phaeton. After than in this belt the comets of the Galaxy had intensive collisions with asteroids bodies. In result on the external side of this belt from gas and dust of comets the Solar gas-dust disk has arisen and planets-giants were generated from disk substance.

Initial masses of planets, and also changes of these masses after destruction of the Phaeton can be established with the help of the reception shown on fig. 1 where dependence of the distributed mass of substance of Solar system on heliocentric distance is given. The distributed mass is determined as  $\rho_i(R_i) = M_i/R_i^3$ , where  $M_i$  and  $R_i$  – mass and distance from the Sun of separate planets [6].



**Fig. 1.** The distributed mass of substance of Solar system

The direct line, which is taking place on fig.1 through points of Venus, Earth, Uranus and Neptune lets to find the mass of planets on the first stage of their formation. This line is spent to satisfy at once to three requirements: 1) to a constancy of mass of Venus and Neptune  $M_i = M_i'$  before and after destruction of the Phaeton; 2) degree dependence of function  $\rho \propto R^{-3}$  at the first stage origin of planets and 3) to exponential reduction of mass of substance  $\Delta M_i = M_i - M_i'$ , the seized external planets to a belt, with their distance from a ring.

The mass of planets calculated on the basis of such interpretation up to destruction of Phaeton  $M_i'$  and also absolute  $\Delta M_i = M_i - M_i'$  and relative  $M_i'/M_i$  changes of these masses in comparison with modern values  $M_i$  are given in tab. 2.

**Table 2**

MASS OF PLANETS ON FIRST AND SECOND STAGE OF FORMATION,  $10^{27}$  g.

| Planet  | Modern mass $M_i$ | Initial mass $M_i'$ | Changing of mass $\Delta M_i$ | Relation of masses $M_i/M_i'$ |
|---------|-------------------|---------------------|-------------------------------|-------------------------------|
| Mercury | 0.333             | 2.88                | -2.56                         | 0.116                         |
| Venus   | 4.87              | 4.87                | 0                             | 1                             |
| Earth   | 5.97              | 6.37                | -0.4                          | 0.937                         |
| Mars    | 0.642             | 8.96                | -8.32                         | 0.072                         |
| Phaeton | 0.0042            | 14.75               | -14.75                        | $2.85 \cdot 10^{-4}$          |
| Jove    | 1899              | 24.43               | +1874.6                       | 77.72                         |
| Saturn  | 568               | 40.06               | +528                          | 14.18                         |
| Uranus  | 87.2              | 70.72               | +16.5                         | 1.23                          |
| Neptune | 102               | 102                 | 0                             | 1                             |
| Pluto   | 0.66              | —                   | —                             | —                             |

It is supposed, that initially masses of all planets except for Pluto answered the common dependence inherited with first stage of Solar system origin. However after destruction of the Phaeton some planets of Solar system have undergone changes, which were reflected in their mass, a structure and average density of substance.

The Venus and Neptune who is taking place on big enough distance from a Phaeton, practically have not changed the mass. The Earth and Uranus who closely adjoin to these two planets changed them is rather weak.

All other planets of Solar system after destruction of the Phaeton have changed more strongly. That has resulted in displacement of their positions on fig. 1 from a dividing line. The deviation upwards from this line was connected to capture by planets of new substance – basically of gases of comets and fragments of asteroids, which leave asteroid ring, and displacement downwards, on the contrary, with loss by planets of own mass. Therefore while external planets (the Jove, Saturn and Uranus) collected new substance and got systems of satellites, internal planets (except Venus) lost own mass.

A planets disposed near a ring of asteroids, could get many gas-dust substances and they has grasped the big mass. Because of the greater remoteness from a ring the Neptune has attached to itself of this substance very little, Uranus is more, still more – Saturn and especially – the Jove.

In tab.2 we give value of masses of a nucleus and an environment of the Jove, Saturn, Uranus and the Neptune calculated in the assumption, that after destruction of the Phaeton these planets, having mass  $M_i'$ , could got  $\Delta M_i$  of new cosmic substance which become their environment.

### 3. Discussion of results and conclusions

Comparison of data (tab. 1) shows, that mechanism of formation of planets-giants, which consists from two phases well explains feature of substance composition and an internal structure of these planets. Deviations from “exact” models of planets-giants are small in all cases. For more massive environment these deviations make 0.3% for the Jove, 1% - for Saturn, 15% - for Uranus and 3% - for Neptune.

In this connection we shall notice, the models [3, 4] are numerical decisions of the mathematics task consisting in definition of characteristics of an internal structure of planets-giants on the base of analysis of their external physical parameters. Such decisions as it is known, not always appear unequivocal and sufficiently exact.

So good consent of values of masses of the environments received on the basis of two essentially different approaches, in our opinion, cannot be simply casual coincidence. On the one hand, it should testify to quite high accuracy of theoretical calculations, and with another, it can consider as the important argument for the benefit of correctness of our conclusion that planets-giants are formed in two phases.

If to take into account the way of education of the modern planets: the Jove, Saturn and Uranus, their central nucleus, according to hypothesis O.J. Shmidt [1], must be presented by the planet generated at the first stage of evolution of Solar system.

Results of calculations [3, 4], explained by concept COSS, allow to note one more important circumstance. Among seized by the Jove and Saturn the substance, which was included subsequently into their environment, rocky fragments of breeds of a Phaeton make up probably appreciable share. According information of tab. 1, with distance from a ring of asteroids the quantity of such fragments is reducing from 3.7% in environment of the Jove up to 1.4% in environment of the Saturn.

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