Following the M.Faraday`s hypothesis, the gravitational field is considered as a viscous-elastic body, which is characterized by a number of properties: modulus of elasticity, viscosity, anisotropic structure, the ability to shear deformation. Rotation and movement of the body in orbit are leading to periodic shear deformation of the field, which is implemented in the form of gravitational radiation. Two equations are suggested to define the speed of its spread. Velocity gradient at the field shear causes concentric orientation of the power lines at which the motion of orbiting bodies takes place without energy consumption. Distance to the orbits with the orientation of force lines obeys the quantum law. The hypothesis on the origin of the magnetic field by the motion of celestial bodies and the shear deformation of the gravitational field is suggested. The repulsive force in space is due to the movement of the body in a magnetic field of another body. The formation of planetary rings depends on the mass and speed of the planet rotation.

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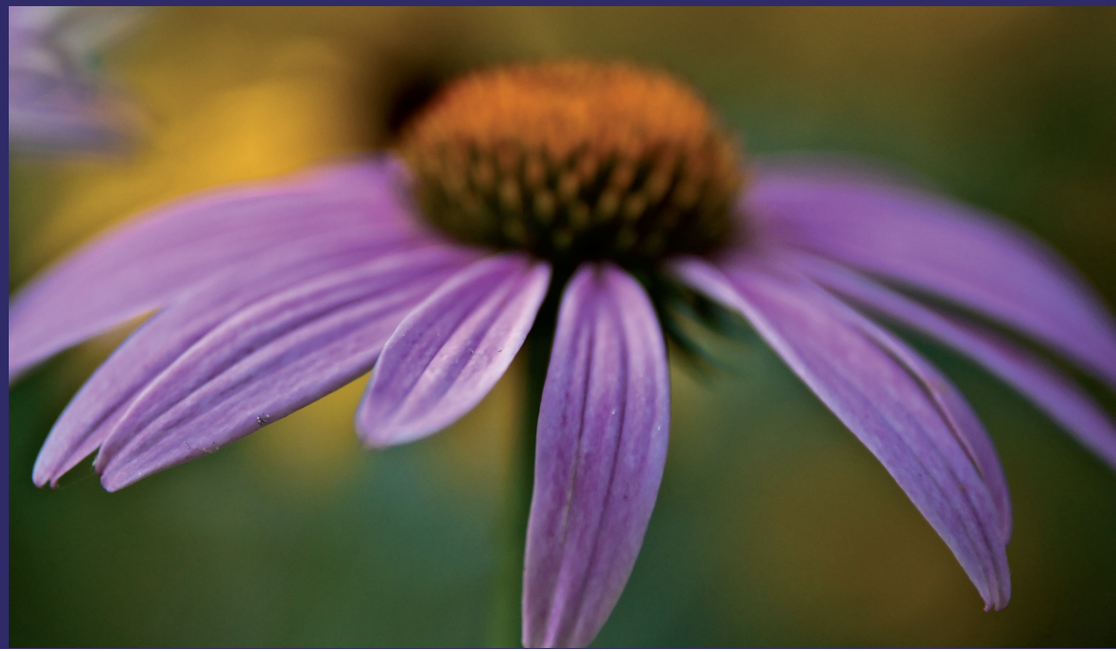

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Faraday`s power lines in space

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Contens

Introduction

The M.Faraday`s power lines as the most important characteristic of the gravitational field, recognized by all, and yet this idea has not found wide implementation of development has not received what she deserves. This question is especially acute in connection with the rapid development of space, the discovery of previously unknown effect ("Pioneer" and satellites "Lageos").

Without invoking the power lines of gravity is impossible to know and explain the laws of planetary distances, the distribution of mass in the solar system, the nature of planetary rings, repulsive forces, gravitational radiation, the difference between gravitational and electric magnetism. The book is an attempt to find ways to the solution these issues.

The first chapter discusses the features of the gravitational field stationary and rotating celestial bodies. At the same time we are based on the M.Faraday`s hypothesis that "The sun generates the field around itself, and the planets and other celestial bodies feel the influence of the field and behave accordingly." Elaborating on this thesis, it was assumed that the gravitational field of a cosmic body is realized in a physical medium (environment, ether, physical vacuum, dark matter) and can be considered as a viscous-elastic body, which can be characterized by a number of properties: modulus of elasticity, viscosity, anisotropic structure, the ability to shear deformation.

Shear strain of the field during the rotation of the body is considered taking into account the laws of dynamics of boundary layers formation, its particular case - separated flow. Provides a balance of forces, where the tearing is realized during the formation of the boundary layer on the surface of a revolution body.

The velocity gradient in the boundary layer results in a concentric orientation of the force lines of the gravitational field. Zone with a maximum orientation of force lines is characterized by minimal resistance movement orbit of the body and is regarded as permissible orbit.

The second chapter is the most important. It based on the experimental data on the evolution of moon satellite orbits is confirmed by many authors predicted a phenomenon similar to electromagnetic induction. Expressed and proved the assumption that the braking of lunar satellites due to the gravimagnetic forces arising at the intersection by satellites the power field lines (lines of tension or force lines) of gravitational field. To calculate the forces used an equation similar electrodynamics' equation of the Lorentz force. Estimated time of satellite braking "Lunar Prospector", "SMART-1" and "Kaguya" coincides with the actual accuracy of ± 14%.

The scheme of the emergence of gravimagnetic forces is proposed, according to which the magnitude of the force depends on Sinα, where α is the angle at which the satellite crosses the gravimagnetic tension line. For non-rotating body - the moon, this angle is equal to 90 degree and the gravimagnetic braking force has a maximum value. In the case for rotating bodies, such as the Earth the intersection of tension line seems to occur at sharp angles and the braking force is much smaller (the "Pioneers" and satellites "Lageos")

It is suggested that the central rotating body by its rotation cause in the surrounding gravitational field periodic alternation of layers with a preferred orientation of radial and concentric force lines of the gravitational field, which leads to different intensity of the gravimagnetic braking forces and emergence of stable (permitted, elite) orbits and unstable (unresolved) orbits with high intensity of braking. An equation that determines the distance to the stable orbits is given. In equation includes a constant C = 2,48.10*8 cm / s is close in magnitude to the gravidynamic constant 2,16.10*8 cm / s, a member of the equation is similar to the Lorentz force equation is used to calculate the power gravimagnetic braking.

Establishing the exact laws of planetary and satellite orbital distances has always been a priority issue in astronomical science. However, for a long time on the empirical rule Titius-Bode law is not passed. The use of quantum principles allowed us to obtain a quantitative relationship between the orbital distances and rotation parameters of the central body. The resulting pattern confirms the above Faraday's statement that the Sun and the planets generates a field around him, and "orbiting celestial bodies feel the influence of the field, and behave accordingly."

The resulting pattern (chapter 3 and 4) states that the orbital radius of a planet or satellite R is defined by the formula: R = n*2 (GMT / C)*0,5, where n- integer, G-gravitational constant, M and T is the mass and period of rotation of the central body C - constant equal 4,63 · 10*8 cm / s. From this formula it follows that the planetary and satellite distances determined by the parameters of rotation of the central body (M, T). Their influence is carried by shear deformation field, which causes the orientation of force lines that "celestial orbit bodies feel and behave accordingly."

The fifth chapter considers the nature of gravimagnetism. Based on the premise that electric charges do not exist, and their functions are carried out by elementary particles, due to the high density of matter in them (~ 10*12 g / cm3) and high rotation speeds (~ 10*15s*-1), the mechanism of magnetic fields formation, according to which the magnetic field induced by the mass of the shear deformation of the electrostatic (microgravity) field and the gravitational field. In the first case realize a field with high intensity, but it is effective at short distances. In the second case, the field has a relatively small stresses, but extends over long distances. The

first kind of magnetism, taking into account the tradition, it is proposed to call electromagnetism, the second - gravimagnetism.

One of the cosmological paradoxes (it is sometimes called Newton's paradox) is that despite the absence of symmetric repulsive force gravitational force of attraction did not cause the collapse of the universe. This paradox has stimulated numerous attempts to detect cosmic repulsive force, which in size would be commensurate with the gravity. In the sixth chapter we prove that cosmic repulsive force in space has a dynamic nature. It occurs when the body has a mass moves in the magnetic (gravimagnetic) field, which is formed by the other body. This gravimetric force is similar to the electromagnetic Lorentz-Ampere force in atomic systems. Gravity and magnetic repulsive force is proportional to the square of the velocity of the moving body, the masses of interacting bodies, Sinus of the angle between the direction of motion and the power lines of gravimagnetic field and inversely proportional to the distance between the bodies in the fifth degree.

The seventh chapter is devoted to the problem of gravitational radiation. It is described two kinds of gravitational radiation due to shear deformation of the field during the rotation of the body and its orbital motion.

Shear deformation of the gravitational field has two components of normal stresses perpendicular to the direction of propagation of gravitational waves G and B. This are the vectors of gravitational and gravimagnetic tension. During the rotation or orbital motion of a body in a circle on the 360*0 the vectors change the direction relative to the selected external coordinate system, and the magnitude of the vector describes the full wave.

Radiation energy during rotation of the body can be described by the secular slowdown in the rate of rotation of celestial bodies. Radiation energy orbital motion of bodies can be estimated by reducing the potential energy of the orbital body during the transition to a low-grade orbit. Energy conversion related to gravitational radiation, are considered by the example of the evolution of the orbit lunar satellite Smart-1.

The formation of Saturn rings was considered as unique phenomenon, peculiar only to this planet. However, in recent years, circular structures were discovered at Jupiter, Uranus and Neptune, which allows to conclude that the universality of this phenomenon. In this book (chapter 8) substantiates the assumption that the formation of rings in the satellite systems associated with the rotation parameters of the central body. The relation between the distance from the planet to the rings and the parameters of the planets, which are expressed as the square root of the product of the planet mass for the period of its rotation is shown. It is suggested that the asteroid belt in our solar system and the Earth's radiation belt belong to the same group of

phenomena form a ring structure by dynamic changes in the surrounding gravitational field.

Chapter 9 is devoted to the laws of the mass distribution. The existence of certain regularities in the distribution of the planets and satellites masses depending on the radius is not in doubt. It is shown that mass distribution and densities of the planets and satellites in the orbital radius is given by the distance between adjacent allowed (elite) orbits and the intensity of the gravitational field. In orbit can not be a cosmic body mass and density greater than specified. Due to the random nature of the capture bodies on their orbit the mass and density can be below given values, which explain the absence of strict regularities in the distribution of the masses of the planets and satellites.

The hypothesis according to which the mass distribution along the radius in the planetary and satellite systems is determined by the distance between neighboring orbits and gravitational tension is proposed. Hypothesis is supported by the linear dependence of the density of orbiting bodies on the value of their orbital radii at the correlation coefficient 0,90-0,91.

In the final tenth chapter is given a critical analysis of the existing theories of the origin of the solar system and is proposed a new interpretation of the problem.

In the process of the emergence and evolution of planetary and satellite systems involve three known mechanisms: condensation (accretion), division and seizure. Condensation and accretion, as well as the slow accumulation in orbit changes occur during the gradual evolutionary change systems, which are then accompanied by an abrupt (catastrophic) change as a result of fission and capture cosmic bodies.

It is summarizes the requirements to be met by the modern theory of the origin of the solar system. The formation of planetary and satellite systems consist of two types of processes: the "revolutionary" and evolutionary. Among the revolutionary are fast processes of fission and capture of bodies. To evolutionary processes belong to condensation and accretion, the gradual orbit changes due to gravitational braking and action disturbing forces. As a result of a gradual change in weight, increase in size, gravitational braking and action perturbing forces orbital system becomes unstable, and there comes a stage of revolutionary change. Celestial bodies have been always existed as well planetary and satellite systems forming or disintegrated by recombination (mechanism of capture) or accidents related to the division or merger of the central bodies and the transition of orbiting bodies to the other orbit. Accretion mechanism operates in the gap between the revolutionary transformations. It is expressed in a gradual change in the mass, the accumulation of secular changes in the orbit, which eventually expressed in the "aging" of the system, the loss of its stability and transformation by mechanism of capture or fission.

Chapter 1. The gravitational field of fixed and rotating bodies

Summary

Based on the M.Faraday`s hypothesis on power lines, the gravitational field is considered as a viscous-elastic body with a set of properties (viscosity, modulus of elasticity) and the ability to shear deformation during rotation. Gravitational field around the rotating body a dynamic boundary layer is formed in which due to the velocity gradient the concentric orientation of power lines take place. In an area with a high degree of orientation the orbital motion of bodies goes without crossing of the force lines and consequently without consumption of energy. It is permissible orbit.

1. Introduction

The Newton`s theory of gravitation was based on the principle of action at a distance, according to which the interaction of bodies at a distance is carried out immediately, without any intermediate substance, that is, in the void. Such an approach could not hold materialistic researchers. Changes have occurred with the advent of electromagnetism, where the need for a medium transmitting interaction was more obvious. . The idea of transmission of electromagnetic interactions by means of field was proposed by the English scientist Michael Faraday. Faraday`s representation of fields based on the concept of power lines as special formations in the a hypothetical medium - ether. The power lines or the tension lines (force lines) permeate the field. They are conventional and allow visualizing the field at a particular physical influence it, giving a graphical and analytic mapping field.

Although the main works of Faraday belong to electromagnetism, astronomers believe [1] that Faraday also "introduced the concept of gravitational field, which controls the planet in orbit. The sun generates a field around themselves, and the planets and other celestial bodies feel the effect of the field and behave accordingly. "

The following article examines the formation of the gravitational field in the fixed and rotating bodies, taking into account the properties of the medium in which the field is realized. Former historical name of this environment - ether is for several reasons, little acceptable. Of the modern notation "physical vacuum" and "dark matter" can be the most appropriate to take the first, although it would be desirable appearance of a new term, which expresses the physical feature of the environment, such as "physical environment", " physical medium " or "ph-media".

Rotation of the cosmic body undoubtedly influences on the environment particularly in the orientation of the field power lines in the space. In turn, the environment affects the dynamics of the rotation, causing deceleration. Question

interaction of the medium the moving body adequately studied in hydrodynamics in the theory of the formation of dynamic boundary layers. It seems reasonable to consider this experience when considering the rotation of celestial bodies in the environment of the physical vacuum.

2. The properties of the physical vacuum

In addition to continuity properties and properties when the "vacuum fluctuations, introducing virtual particles may exert pressure on the body," described in the literature [2], based on indirect evidence suggests that the physical vacuum is a viscous-elastic body whose properties can be characterized by the value of modulus and viscosity coefficient.

In materials science for objects with extremely high elastic properties are widely used methods for determining the modulus of elasticity of materials on the propagation velocity of ultrasonic waves. The higher the speed of propagation of ultrasound is the higher modulus material. The velocity of propagation of electromagnetic and gravitational radiation in the physical vacuum is very high, respectively, 2,998.10*10 and 2,3.10*8 cm / s. Consequently, we can assume that the physical vacuum as the medium in which the radiation propagates, has a high modulus of elasticity.

As for the viscous properties of the physical vacuum, they are similar to the rotational viscometer can be detected by slowing the speed of rotation of celestial bodies. Be reliably defined for the Earth and is about 0,001s for100 years. This is secular slowing down the speed of rotation of the Earth. It is usually explained by the action of tidal forces of the Moon and the Sun. However, the inhibitory effect of the viscosity of the physical vacuum (physical environment) is also quite likely.

Another well-known fact testifies to delay the speed of rotation of celestial bodies in the process of evolution - a decrease in the rate of rotation of stars in the Main sequence. It is assumed that at the initial stage of evolution the equatorial rotation speed of the stars reaches 10-100 km / s. At the stage at which the Sun is located, it is 2 km / s, and continued to decrease until the release of the Main sequence.

Consider the possibility of quantifying the approximate viscous braking of the rotating cosmic body due to its shear interaction with the physical environment (physical vacuum).

Figure 1 show a diagram of this interaction, which can be used to calculate the "viscosity" of the physical vacuum. Rotating cosmic body (1) with a radius R slows its rotation under the effect of tangential force f, which is caused by the viscous resistance of the surrounding physical environment (physical vacuum). The linear

velocity of the medium at the equator is the linear velocity of the body v. As the distance from the center of the body linear velocity of the medium due to its viscosity decreases to zero at the boundary of the action of the gravitational field of a rotating body at a distance Rg. To calculate the viscosity can use the Newton's law:

$$f = \mu. \ (\Delta v \ / \ \Delta R) \ .s, \qquad (1)$$

where f- tangential force, causing the shear of the physical environment, μ- viscosity coefficient, Δv / ΔR- velocity gradient and s- area of the layer on which there is a shear.

Using the expressions (1) to and date on the slow the rotation speed of the Earth earlier [3] was calculated the viscosity of the physical vacuum and then after the resulting viscosity a value was estimated the deceleration of the Sun rotation speed.

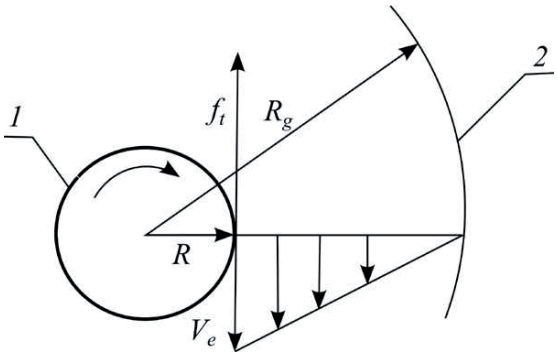

Fig.1. Scheme of braking speed rotation of the cosmic body due to the viscosity of the physical vacuum: 1- rotating body, 2-border effect of the gravitational field of a rotating body, f- tangential braking force, v- equatorial velocity, R- radius of the body, Rg- radius of the sphere of action of the gravitational field formed body.

Also, based on indirect evidence can be seen on the property of the physical vacuum, undergo longitudinal and shear deformation. Moreover, due to the high modulus tensile longitudinal strain apparently is small. Shear deformation occurs during the formation of gravitational waves, which, by analogy with electromagnetic are apparently cross.

3. The gravitational field of a stationary body

Cosmic body creates around itself a force field - the gravitational field. The main characteristic is its gravitational strength tension at any point. It characterizes the force which acts on a point located in this different body. The tension is given by:

$$g = F / m, \qquad (2)$$

where g- the field strength (tension), F- gravitational force, m- mass of the test body made to the field.

The gravitational field can be described analytically by calculating it's intensity for each point of the field or graphically, causing tension in the plot line or field lines. An example of a graphic image of the gravitational field is shown in Figure 2. Power lines or tension lines (1) begin at cosmic body (2) and extend into the surrounding space according to the formula (2) to infinity. When interacted many bodies the line tension can take a curved shape and then on the graph the field strength can be characterized by density of the location of power lines.

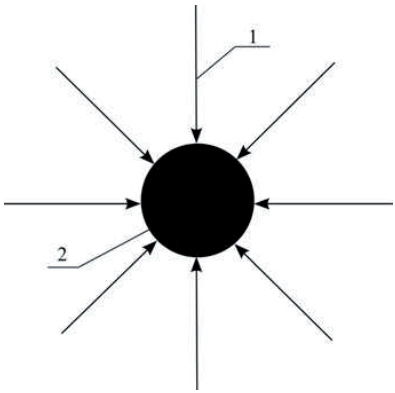

Fig.2.Schematic representation of the gravitational field: 1 - line tension (power line), 2 - cosmic body.

In accordance with the above concept to consider the surrounding physical environment induced in her gravitational field as elastic-viscous body can be assumed that this body has the ability to tensile strain and shear. The greatest interest is the shear deformation, which during rotation of the body can cause a concentric orientation of the force lines and thus reduce the resistance of the field orbital motion space bodies.

4. The gravitational field of a rotating body.

The interaction of a rotating body with elastic-viscous gravitational field, like other elastic-viscous fluids (liquids, gases) can be considered within the theory of dynamic boundary layers. However, with a persistent finding in the literature [4], it is almost not possible to find data on formation the boundary layers the rotating bodies.

The closest well-studied case can be considered a tear flow when the fluid flow separates from the surface of the curved shape. At the front of the body curved shape (Fig. 3) the flow velocity in the boundary layer decreases from the value v_0 on the outer edge of the layer and to v = 0 on the body surface, At the point s there is separation of a laminar boundary layer, and turbulization of the flow.

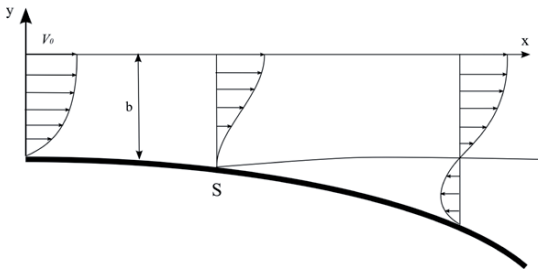

Fig. 3. The scheme of formation of separated flow around the flow body with a curved generatrix: v_0 is the flow velocity, s - point margin, δ - thickness of the boundary layer.

Given that according to the accepted concept to consider the gravitational field as a viscous-elastic medium, we can assume that during the rotation of a celestial body around it will produce dynamic laminar layer δ, the thickness of which will depend on the mass and speed of its rotation and to meet space scale (tens to hundreds of thousands of miles).

Figure 4 provides a diagram of the dynamic boundary layer (2) of the gravitational field on the surface of a rotating spherical celestial body (1). The body rotates at a linear velocity v_0. Due to the viscosity of the environment (physical vacuum) formed in the boundary layer, the velocity gradient. On the body surface at point s, the velocity of the particles of the physical environment is equal to the linear velocity of the body v_o. As the distance from the surface it drops to zero at the surface boundary layer.

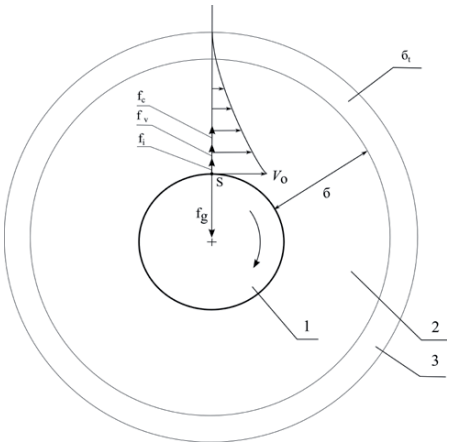

Fig.4.The formation of a boundary layer δ around the rotating sphere: 1 – rotating sphere, 2 - laminar boundary layer, 3 - turbulent boundary layer, v_o - linear speed on the surface of a sphere, s – point separation, fg is the gravitational force, fc is the centrifugal force,

At point s on the boundary layer, there are several forces that seek to tear it from the body surface. Most of this is centrifugal force f_c due to rotation of the body. Another force that is oriented on the boundary layer separation is a normal component of the force is the viscous resistance of the physical environment f_v. Has a certain value of the normal component of the inertial force f_i, although in the modern sense of the properties of the physical vacuum is hard to speak about its mass (dark matter!). These forces are balanced by gravitational force f_g, so that the formation of a boundary layer around the rotating spheres equality:

$$f_g = f_c + f_v + f_i, \qquad (3)$$

For a laminar boundary layer lies a turbulent layer δ_t (3). However, the turbulent layer, apparently, can occur directly on the surface of the body, if the three components of the breakout forces in equation (3) will be greater than the gravitational force.

Of great importance is the velocity gradient in the boundary layer. Thanks to the difference of the layer velocity will be concentric (tangential) orientation of the force lines that will lead to such changes in the properties of the gravitational field in which the orbital moving body will not cross the power lines and expend energy on their intersection. Due to the concentric orientation of the power lines appear energetically favorable orbit on which the appeal cosmic bodies will be without energy consumption.

Conclusions.

1. The considering the characteristics of the gravitational field of stationary and rotating celestial bodies proceeded from the hypothesis M Faraday that "the Sun generates a field around itself, and the planets and other celestial bodies feel the influence of the field and behave accordingly."
2. The gravitational field of a celestial body is implemented in the physical environment (ether, vacuum, dark matter) and is considered as a viscous-elastic body, which can be characterized by several properties: module tension, viscosity, anisotropic structure, the ability to shear deformation.
3. Shear strain field during the rotation of the body takes in to account the regularities of the dynamics of boundary layers formation, in its particular case - separated flow. Given the balance of forces, in which a separated flow is realized with the formation of a boundary layer on the surface of the rotation body.
4. The velocity gradient in the boundary layer leads to a concentric orientation of the power lines of the gravitational field. The area with the maximum orientation of the power lines characterized by minimal resistance to movement of the orbiting body and is treated as an allowed orbit.

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Chapter 2. Gravimagnetic braking of celestial bodies.

Summary

Expressed and justified the assumption that the braking satellites of the moon due to gravimagnetic forces arising at the intersection of the satellites of power lines (line tension) of the gravitational field. To calculate the forces used an equation similar electrodynamics equation of the Lorentz force. The estimated braking time for "the lunar Prospector", "Smart-1" and "Kaguya" is the same as the actual precision of ± 14%. The scheme occurrence of gravimagnetic forces is proposed, according to which the magnitude of the force depends on Sinα, where α is the angle at which the satellite crosses the line gravimagnetic tension. For non-rotating body as Moon, this angle is equal to 90*0 and thegravimagnetic braking force has a maximum value. In the case of rotating bodies, such as Earth, the intersection of the gravimagnetic tension lines, apparently, is at a sharper angle and the braking force is substantially less (the effect of "Pioneers" and the satellites "Lageos").

Suggested that the rotating of the central body causes the surrounding gravitational field with a periodic alternation of layers with a predominant radial and concentric orientation of the force lines of the gravitational field, which leads to a different intensity of the forces and gravimagnetic braking along the radius and emergence (allowed, elite) and unstable orbits (unresolved) orbits with high speed braking.

The equation is proposed which determines the distance to stable orbits. In the equation a constant C = 2,48.10*8 cm/s is close in magnitude to the gravidynamic constant of 2.16.10*8 cm/s, which is included in the equation similar to the equation of the Lorentz force, which was calculated power gravimagnetic braking.

1.Introduction

"Does the gravitational field of the similarity with magnetic? Turn any electrical charge, and you get a magnetic field. Turn any mass, and, according to Einstein, you have to detect very weak effect, something similar to magnetism" is so popular NASA has justified the need to launch several satellites to detect effects of gravimagnetism. We are talking about the launch of the satellite gravity probe B (Gravity Probe B), in which gravimagnetic effect is expected to detect at the exact precession of gyroscopes mounted on the satellite [1]. In another experiment (frame-dragging), associated with the launch of two geodynamic satellites Lageos-1 and

Lageos-2 (LAGEOS and LAGEOS II), it was shown [2] that the precession was only 20% of the level predicted by the theory.

Gravimagnetic effect can be detected not only by the precession of gyroscopes or "rotating frame", but also for deceleration or acceleration of the satellite depending on the direction of the force lines of the gravitational field and the direction of motion of gravitating bodies. Seems anomalies in the movement of the "Pioneers" in their acceleration or deceleration depending on the position in respect of gravitating bodies are also a consequence of gravimagnetic interaction [3].

In this work the effect of gravimagnetism is considered on the example of anomalously high speed braking satellites of the moon and the laws of planetary and satellite distances, which, as it turns out, is also related to gravimagnetism through the rotation parameters central bodies.

2. Gravimagnetic power

Continuing the analogy with electrodynamics, braking force when interacting gravitating bodies can be expressed by the formula similar to the known electrodynamics equation of the Lorentz force:

$$f_{gm} = (v/C)^2(GMm/r^2)\mathrm{Sin}\ \alpha, \qquad (1)$$

Where f is the force gravimagnetic interaction of bodies with masses M and m, remote distance r squared and moving relative to each other with velocity v in the direction at an angle α to the intensity vector gravimagnetic field, G is a gravitational constant and C is a constant with the dimension of velocity cm/sec. This will Illustrate scheme, see 1 a and b.

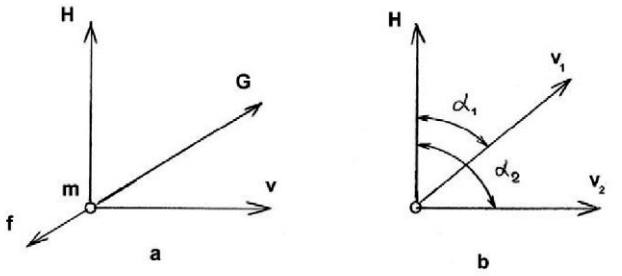

Fig.1. Scheme of occurrence gravimagnetic forces: (a) a body with mass m, moving with velocity v in a gravitational field G, generates gravimagnetic field intensity H and the force f; (b) gravimagnetic force f (perpendicular to the plane

of the drawing up) has a maximum value when α2 = 90^0 and sinα = 1, the reduction of the angle α leads to a decrease in f, if α = 0 the force f is also zero.

Body m moves in a gravitational field G with velocity v at right angles to the power lines, Fig. 1a. The movement body m causes gravimagnetic field intensity H, the vector of which is directed normal to the vector of gravitational field strength G and the direction of body motion v. In this case, the moving body m will act normal to the direction of motion and the vector gravimagnetic tension braking force f. The magnitude of this force depends on the angle between the motion direction and the intensity vector gravimagnetic field H, see Fig.1 b. At α = 90^0 Sinα = 1, and the force f has a maximum value. When decreasing α below 90^0 decreases f and when α = 0 the braking gravimagnetic force disappears. The body moves in gravimagnetic field without resistance and energy consumption.

To confirm advanced assumptions gravimagnetic braking bodies consider for example, at motion of satellites of the moon.

3. Gravimagnetic braking satellites of the moon

Starting with the first orbital flight of a satellite of the moon "Luna-10" [4, 5], which was launched on 3 April 1966, it became clear that the lunar satellites have abnormally high acceleration and the duration of their existence on the orbit is limited. Of all possible causes inhibition: perturbations due to the influence of the Sun and the Earth, the uneven distribution of mass, the presence of the moon, though very thin atmosphere, the impact of the solar wind - focused [6] non spherical shape of the moon. It was shown that perturbations caused by the non centric gravitational field of the Moon is5-6 times larger than the perturbations due to the Earth's gravitation, and the latter exceeded the solar 180 times.

The main reason for the occurrence of braking forces of the moon satellites may not be the uneven mass distribution, in particular the no spherical character of the Moon. Any algorithm for calculating the impact of uneven distribution of mass, the result depends on the mass of the satellite. The larger the mass, there is stronger interaction and the less the lifetime of satellites in orbit.

However, the available data do not support this conclusion. For example, the satellite Kaguya" had a lot 2371 kg, and the duration of his stay in orbit amounted to 539 days, while the lunar Prospector", having mass 158 kg, ceased to exist after 182 days. As will be shown below, the deceleration time of the Moon satellites does not depend on their mass.

The scheme gravimagnetic braking of the moon satellites is shown in Fig. 2. A satellite with mass m moves with velocity v, traversing radially spaced the force lines of the gravitational field G. The direction of the intensity vector occurring due to the motion of the satellite is perpendicular to the plane of the figure upwards. A satellite is braking by force f that causes the decrease of the orbital distances. By analogy with electrodynamics braking is accompanied by the gravitational radiation at a rate equal to the constant C in equation (1).

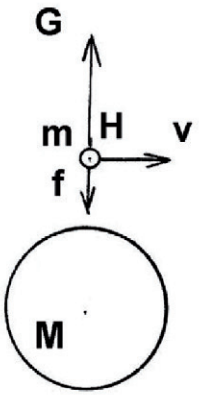

Fig. 2. Scheme gravimagnetic braking the lunar satellite: a satellite with mass m moves with velocity v, traversing radially spaced force lines G of the Moon gravitational field (M); the direction of the intensity vector gravimagnetic field arising due to the motion of the satellite perpendicular to the plane of the drawing up; a satellite is retarding force f that causes the decrease of the orbital distance.

Braking force satellite f in addition to equation 1 can be expressed by the equation of momentum:

$$ft = m(v_2 - v_1), \qquad (2)$$

where m is the satellite mass, t is the time of braking, v_1 and v_2 are the velocities before and after braking. Combining equations (1) and (2) obtain a convenient expression for calculating the time of flight of the satellite:

$$t = (C/GM)^2 r^3 (v_2 - v_1), \quad (3)$$

where t is the time of flight, C is a constant having the dimension of velocity cm/s, G is the gravitational constant $6{,}67.10^{-8}$ cm3/G2, M is the mass of the Moon 0,735.1026 g, r - average orbital distance (the semi major axis) at the beginning of the flight, v_1 and v_2 are the initial and final orbital velocity, calculated at an average orbital distance.

Returning to the question of the effect of aspheric of the moon on the braking of its satellites, note that in equation (3) expressing the time of flight the satellites is no their mass. This confirms the previously made conclusion about the independence of the flight time from the mass of the satellite.

The constant C in equations (1) and (2) if you follow the accepted analogy with electrodynamics, by definition, is the speed of gravitational radiation. Thus, equation (3) can be used to calculate dynamic gravitational constant, i.e. the velocity of propagation of gravitational waves.

The constancy of the constants when calculating for different satellites will confirm the correctness of the methodological approach. Below is data for the calculation of the constants for the evolution of the orbits of the fife satellites of the Moon, including the Soviet satellite Luna-10", American satellite "the lunar Prospector", a satellite of the European space Agency's Smart-1", as well as Japanese and Indian satellites "Kaguya" and "chandrayan-1.

Consider the launch and flight of Sputnik "Luna-10". First, "Luna-10" was put into orbit an artificial satellite of the Earth. Then, using the upper stage, the speed of the station was reduced to 10.9 km/s. At that speed, the duration of the flight to the Moon was slightly less than three and a half days.

Then was the correction of the trajectory, after which the station entered the sphere of gravitational influence of the Moon.

At the final stage of the flight (800 km from the Moon) station has been previously appropriately focused and calculated point remote from the surface of the moon for 1000 km was included braking engine unit and the speed was reduced from 2.1 to 1.25 km/s, which provided the transfer station under the action of the attraction of the Moon with the span of the trajectory on selenocentric orbit with the following parameters: the greatest distance from the surface of the Moon - 1017 km (apocenter 2,755.108 cm); smallest - 350 km(pericenter putting on 2,088.108 cm); the average distance (the semimajor axis)- 2,422.108 cm; average orbital speed - 1,4229.105 cm/s; period of revolution around the moon - 2 hours 58 minutes 15 seconds; the angle of inclination of the satellite's orbit to the plane of the lunar equator - 71° 54.

The mass of the spacecraft after separation from the booster was 1582 kg, the mass of the lunar satellite 240 kg

Artificial satellite of the Moon "Luna-10" there were active 56 days (0,0484.108 (s) having 460 revolutions around the Moon. After the batteries have been depleted, the relationship was terminated on May 30, 1966. Orbit at this time had parameters: minimum destruction of 378 km (pericenter 2,116.108 cm), the greatest destruction of 985 km (apocenter 2,723.108 cm and an inclination of 72.2 degrees. The average distance (the semi major axis)- 2,420.108 cm. Average orbital speed - 1,4235.105 cm/s.

Substituting the given data into the formula (3), find the value of the constant C = 3,694.10^8 cm/s Calculated data are presented in Table 1. Perform similar calculations for other travelers of the Moon.

Table1. The calculation of the duration of the flight, the constants C and braking force to the satellites of the Moon.

Country, satellite, launch date	Время полёта, t.10^{-8} s		r=r_1. 10^{-8} cm	v_1. 10^{-5} cm/s	r_2. 10^{-8} cm	v_2. 10^{-5} cm/s	C. 10^{-8} cm/s	m. 10^{-6} g	f, din
	real	cal.							
The USSR, "Luna-10", 03.04.66	0,048	0,016	2,422	1,4229	2,420	1,4235	3,690	0,240	2,98
USA, the lunar Prospector", 07.01.98	0,157	0,153	1,768	1,6651	1,738	1,6794	2,178	0,158	14,4
EEC, "Smart-1", 30.09.03	0,122	0,154	3,413	1,1984	3,4025	1,2004	1,919	0,367	6,03
Japan, "Kaguya", 14.09.07	0,466	0,395	1,838	1,6332	1,776	1,6661	2,342	2,371	167
India, "Chandrayan-1, 22.10.08	-	0,556	1,838	1,6332	-	-	-	0,523	-

Accordingly, the orbital velocity at the beginning of the highlighted portion of the orbit v_1 = 1,665.10^5 cm/s and at the moment of falling v_2 = 1,680.10^5 cm/s Substituting the above values in the formula 3, we get the value of the constants C = 2,25.108 cm/s, that is close in order of magnitude to the value of the constants calculated for the satellite "Luna-10. The satellite of the moon, Smart-1 (Smart-1: the acronym for Small Mission for Advanced Research in Technology) launched by the European space Agency September 30, 2003 [8]. Initially, it was launched into an elliptical low earth orbit typical of telecommunication satellites with the help of the rocket Ariane-5. Then the output on the lunar orbit was carried out using a low-power (thrust force of 0.07 N) ion propulsion and lasted 16 months.

After moving into the area of the gravity of the Moon and the braking propulsion system on November 11, 2004 "Smart-1" has been translated into lunar orbit. The mass of the satellite 367 kg After number of maneuvers in the period from 28 February to July 18, 2005 the satellite was in free flight, that is, without the inclusion of the propulsion system. The orbital parameters at the beginning of this period: apocenter 4,6182.10^8 cm and the pericenter 2,2087.10^8 cm. The average distance (the semi major axis) 3,4134.10^8 cm After a flight during 0,121.10^8s apocenter decreased to 4,4957.108 cm, and the pericenter increased to 2,3493.10^8 cm. The average distance decreased to 3,4025.10^8 cm.

Orbital speed at the beginning and end of the free flight accordingly was 1,1984.10^5 and 1,2004.10^8 cm/s Substituting the obtained values of the average distance in the beginning of the period of free flight and orbital velocity at the beginning and end of the flight in the formula 1, we get the value of the constant C = 1,91.108 cm/s, which is close enough to the values previously given for satellites "Luna-10" (3,69.10^8 cm/s) and the lunar Prospector" (2,25.10^8 cm/s).

Japanese satellite of the Moon "Kaguya" was launched on 14 September 2007 with the Japanese Baikonur Tanegasima using booster h-2A (H-2A) [9]. The mass of the satellite 3000 kg. To the orbit of the moon it was only appear on 4 October 2007. After separation of the two auxiliary satellites, test equipment and instruments basic core ("Main orbiter") mass 2 27 1kg December 2007 began their regular observations on polar circular orbit with altitude of 100 km (the distance from the center of 1,838.10^8 cm, orbital speed 1,6332.10^5 cm/s).

The time of the flight without the inclusion of the propulsion system lasted until June 11, 2009, that is 0,466.10^8 s. At the point of activation of the brake motor installation altitude was 27.8 km (the distance from the center of 1,776.10^8 cm), which corresponds to the orbital velocity 1,6661.10^5 m/s . Then, after 6 minutes the

connection with the satellite was lost. Substituting the values of change of orbital parameters in the formula 1, we get the value of the constant C = 2,34.10^8 cm/s, very close to the values previously calculated for other satellites.

Indian space research organization (ISRO,) reported [10] about the launch of 22 October 2008 on a circumlunar orbit of his device

"Chandrayan-1 using developed in Indian rocket PSLV-XL (PSLV - Polar Satellite Launch Vehicle from Baikonur Satish Dhawan. Starting weight station was 1380 kg, weight station in lunar orbit - 523 kg.

After a series of maneuvers November 4, the station went on the flight path to the Moon and on 8 November reached the environs of the Moon, where at a distance of 500 km from the surface was included brake motor, resulting in the station moved to a transitional circumlunar orbit resettlement 504 km, aposelene 7502 km and an orbital period of 11 hours. Then on 9 November, after adjustment of the pericenter of the orbit was lowered to 200 km. On November 13, the station was transferred to the circular working circumlunar orbit with altitude of 100 km (1,838.10^8 cm from the center of the Moon), a cycle time of 120 min, the orbital speed 1,6332.10^5 cm/s.

On August 29, 2009 ISRO announced that radio contact with the satellite was lost. By the time of the loss of communication with the satellite, it stayed in orbit 312 days (0,27.10^8 (s) and managed to make a 3400 revolutions around the Moon.

Indian space research organization claims that her device will be in lunar orbit for another 1000 days. The lack of data on the orbital parameters after braking satellite Chandrayaan-1 does not allow the calculation of the constant C. However, determining the average value for other satellites, using equation (3) to confirm or refine the prediction of the lifetime of the satellite "Chandrayan-1.

The average value of the constant C it is advisable to calculate on three .satellites: "the lunar Prospector", "Smart-1" and "Kaguya". It is of 2.16.10^8 cm/s. The large deviation of the satellite is "the Moon-10" - 3,690.10^8 cm/s is associated with significant orbital eccentricity at which the intersection of the gravity-magnetic power lines occurs at small angles and braking force in accordance with equation (1) is small. Therefore, the estimated flight time is significantly less than the actual, since the calculation was made according to the formula (3), in which the angle α was not taken into account.

With regard to satellite "Chandrayan-1, the calculation showed that the total time spent in orbit until the fall on the surface of the Moon is 644 days including 332 days after loss of communication with the satellite.

The deviations of the estimated time from the actual for other satellites are given in table 1. In the case of a satellite, the lunar Prospector" observed the coincidence of two values: 0.157.10^8 and 0,153.10^8 C. For "Smart-1" rated value is 12.5% higher than the actual, for the "Kaguya" 15% below the actual time of flight of

the satellite. This coincidence of the calculated and observational data confirms the correctness of the made assumptions about the braking satellites of the moon due to gravimagnetic forces.

4. The influence of gravimagnetism on planetary and satellite distance

Let us consider the problem of the connection between phenomena gravimagnetism with the regularity of planetary and satellite orbital distances. Here it is appropriate to remind once again about the ideas of M. Faraday, who introduced the concept of the gravitational field, managing the planet in orbit. “The sun generates a field around itself, and the planets and other celestial bodies feel the influence of the field and behave accordingly."

Unlike the Moon, the Earth has its own rotation around its axis. This rotation may distort the lines of tension from $\mathrm{Sin}\alpha = 1$ to $\mathrm{Sin}\alpha = 0$, that is, braking force in a rotating central bodies can have a very small value.

It can be assumed that the rotation of the Earth causes deformation of the surrounding gravitational field, and this oscillatory motion, in which are formed of concentric layers with different orientation vector gravimagnetic tension. When the orientation is close to concentric ($\mathrm{Sin}\alpha \approx 0$) the motion is without braking and energy consumption, i.e. elite or permitted orbits. If the orientation of the vector gravimagnetic tension is close to radial, as in the case of the Moon, the braking is happened and the satellite moves to the bottom of the orbit lying with less potential energy.

In some works [11, 12] it is shown that planetary and satellite orbital distance r is expressed by the equation similar to equation Bohr quantization of orbits in the atom:

$$r = n^2k, \qquad (4)$$

where n is an integer (quantum) number, k is a constant having a constant value for the planetary and each satellite system.

The k values calculated for planetary and satellite systems, are presented in table 2. For different systems, while maintaining consistency within the system, the value of k varies within wide limits [13]. For the planetary system it is 6280.10^8 cm, and the smallest satellite system Mars $1{,}25.10^8$ cm, there are 5 000 times smaller.

Seemed interesting to find such a mathematical model, which would be in the same equation was combined planetary and satellite systems. In this respect fruitful was the idea expressed by H. Alfvén [14], that “the emergence of an ordered system of secondary bodies around the primary body - whether it be the Sun or a planet, definitely depends on two parameters initial body: its mass and speed".. It has been

shown [13] that when the normalization constant k in the complex, representing the square root of the product of the mass of the central body for the period of its rotation (MT)of $^{0.5}$, the result is a constant value, see table 2. If the constant k is changed for the considered systems within 3.5 decimal orders of magnitude, normalized by $k/(MT)^{0.5}$ value saves the apparent constancy, rather varies from $0.95.10^{-8}$ to $1.66.10^{-8}$ Thus, in a mathematical model expressing the regularity of planetary and satellite distances should include the mass of the central body and the period of its rotation, two factors (mass movement) determining the occurrence of gravimagnetic forces in the system.

Further, in the synthesis equation, it seemed natural, should include the gravitational constant G. By a large number of trial calculations, it was found that equation (mathematical model) that combines planetary and satellite systems, is the expression:

$$r = n^2(GMT/C)^{0.5}, \quad (5)$$

where n is the number of whole (quantum) numbers, C is a constant having the dimension of velocity, cm/s, see table 2.

Table 2. The values of the constants k and C

System	$k\cdot 10^{-8}$, cm	$(MT)^{0,5}$ 10^{-16} $r^{0,5}s^{0,5}$	$k/(MT)^{0,5}$ $\cdot 10^{8}$	$C\cdot 10^{-8}$, cm/s
Sun	6280	6600	0,95	7,34
Earth	3,84	2,27	1,69	2,33
Mars	1,25	0,754	1,66	2,63
Jupiter	28,6	26,0	1,10	5,52
Saturn	14,7	14,8	0,99	6,76
Uran	11,8	7,31	1,61	1,60
Neptun	9,85	7,33	1,34	1,92

Consider in more detail and compare the constants C, included in gravimagnetic equation (1), (3) and equation (5). In both cases, the constants have the same dimension cm/s and approximate nearer value. The average value of the constants included in equations (3) and (5) respectively of $2.16.10^8$ and $4{,}01.10^8$ cm/s, We can assume that we are talking about the same dynamic gravitational constant, similar to the electrodynamics constant, i.e. the speed of light.

The overstated value of a constant, calculated according to equation (5) is connected with the incorrect definition of the period of rotation of the gas-liquid central bodies for example, the rotation period of the Sun at the equator is equal to 25 days, and at high latitudes 33 days. It is clear that the inner layers and the entire body as a whole rotate at a higher speed. In accordance with the formula (5) this will lead to a lower constant value C.

The most accurate values are constants C values calculated for solid planets Earth and Mars, the period of rotation of which is determined accurately. The average value of the constants for these two planets is equal $2{,}48.10^8$ cm/s, which almost coincides with the average value of the constant $C = 2{,}16.10^8$ cm/s, calculated by the formula (3) for satellites "the lunar Prospector", "Smart-1" and "Kaguya".

Thus, with a high degree of reliability can be argued that the constant C in equations (1), (3) and (5) are identical and express the same process gravimagnetic interaction of masses. In the first case the interaction is not rotating Moon and rotating around it satellites, in the second rotating central bodies (the Sun, planets) and their orbital bodies.

The results about gravimagnetism braking when the orbiting bodies driving around a non-rotating Central body - the Moon are in good agreement with the known data that celestial body which does not have its own rotation around its axis (Mercury) or low speed (Venus), do not have satellites. In contrast, satellites of rotating central bodies are braking poorly, especially when moving in orbits with a maximum shear strain of the gravitational field and, accordingly, with a peak concentric orientation of gravimagnetic power lines.

The bulk wave maximum deformation occurs at the equator and extends then in the equatorial plane. Captured satellites quickly decelerate and fall on the Central body. This explains the predominant position of the planets and satellites in the equatorial plane of a rotating central body. Here the greatest shear deformation and concentric orientation gravimagnetic field and the least resistance to movement of the orbital phone. For the same reason it is impossible the existence of polar satellites. Their orbit crosses the force lines at an angle close to 90^0. Due to the high gravitational resistance, they quickly decelerate and fall.

A satisfactory explanation also receives the same direction of orbital motion with the rotation of the central bodies and synchronous rotation of the planets and the Sun.

Conclusions

1. The assessment of the gravity-magnetic effect by braking of the satellites of the Moon "Luna-10", "the lunar Prospector", "Smart-1", "Kaguya" and "Chandrayan-1 is given. For the quantitative description of effect used equation gravimagnetic braking similar electrodynamics equation of the Lorentz force and the equation of momentum. The constant part of the equation braking, has a value of $C = 2{,}16.10^8$ cm/s. Estimated time flight of satellites on orbit "the lunar Prospector", "Smart-1" and "Kaguya" is different from the actual ± 14%.
2. On the basis of gravimagnetism braking orbital bodies is obtained the empirical formula, which expresses the dependence of the orbital planetary and satellite distances from a number of whole (quantum) numbers, mass and period of rotation of the central body. The formula is a constant having the dimension of velocity, equal for the solid planets $C = 2{,}48.10^8$ cm/s. Based on the mapping of constants in braking equation and in the formula of orbital distances the conclusion was made about the identity of these constants.

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Chapter 3. The dependence of planetary and satellite distances from the speed rotation of the central bodies

Summary

In Chapter an attempt is made to determine in the equation of planetary and satellite distances the universal constant, which would unite planetary and satellite systems and allow with sufficient accuracy to calculate the elite orbit. To the solution of the problem has been approached through the use of complex representing the square root of the product of the mass of the central body of the system and the period of its rotation.

1.Introduction

The analysis of the dynamic structure of the Solar system, made in the work of B. I. Rabinovich [1], has brought to the fore the problem of stability of periodic motions in systems with commensurate frequencies, which are closely linked to the existence of elite orbits in planetary and satellite systems. A priority issue in this problem is the establishment of the laws of planetary and satellite distances. The author prefers the proposal made earlier by A. M. Chechelnitsky [2], according to which the radii of the elite orbits of planets and satellites R_n determent by quartos law:

$$R_n = k\, n^2, \qquad (1)$$

where k is a constant and n is an integer number that determines the position of the elite orbit.

The proposed law, in contrast to empirical rules Titius-Bode [3] more accurately describes the dependence of planetary and satellite distances for all systems. In addition, it allows detecting the quantum properties of the gravitational planetary systems.

On this occasion, F. A. Gareev writes [4]: "In the framework of the considered model it is possible to conclude that in the Solar system quanthouse sectorial and orbital velocity and orbital distances of the planets and their satellites". The author on the basis of the equation (1) for planetary and satellite systems received constant (h/mG) is the quantum double sectored speed. The value of this constant for the different systems is presented in table 1. According to the author's constant

satisfactorily within ±5% remains constant for the same system. However, between the difference reaches 5 decimal orders of magnitude.

Table 1. The values of the constants (a/mG) for planetary and satellite systems and its relationship with the rotation parameters of the Central bodies systems.

System	*Constant* $(\hbar/m_G)\ 10^{-6}\ km^2/c$	**Ratio:** $(\hbar/m_G)/\ (MT)^{0,5}\cdot 10^{22}\ km \cdot g^{-0,5}/s^{-1,5}$
Planet	953	0,14
Jupiter	2,38	0,092
Saturn	0,341	0,023
Urane	0,207	0,028
Neptune	0,803	0,103
Mars	0,0104	0,014
Earth	0,130	0,057

This article in the framework of representations arising from law formulated in equation (1), an attempt is made to establish a universal constant, which would unite planetary and satellite systems. When this work has taken into account the statement of Alven H. [5], "the emergence of an ordered system of secondary bodies around the primary body - whether it be the Sun or a planet, definitely depends on two parameters initial body: its mass and speed".

2. Orbital distance for satellite systems

To establish the relationship between constant k and rotation parameters of the central bodies of planetary and satellite systems were calculated constants for planetary systems, and systems of Jupiter, Saturn, Uranus and Neptune. Table 2 shows the calculated values of k, for the planetary system, calculated by equation (1). The values of n for the calculation were taken from the work of F A. Gareev. The obtained average value of the constants $k= 6{,}28\cdot 10^{11}$ cm with standard deviation of $0.49\cdot 10^{11}$ cm. Also the dependence of planetary distances from the squares of integers represented in Fig. 1, which confirms the correctness of the values of the integer n.

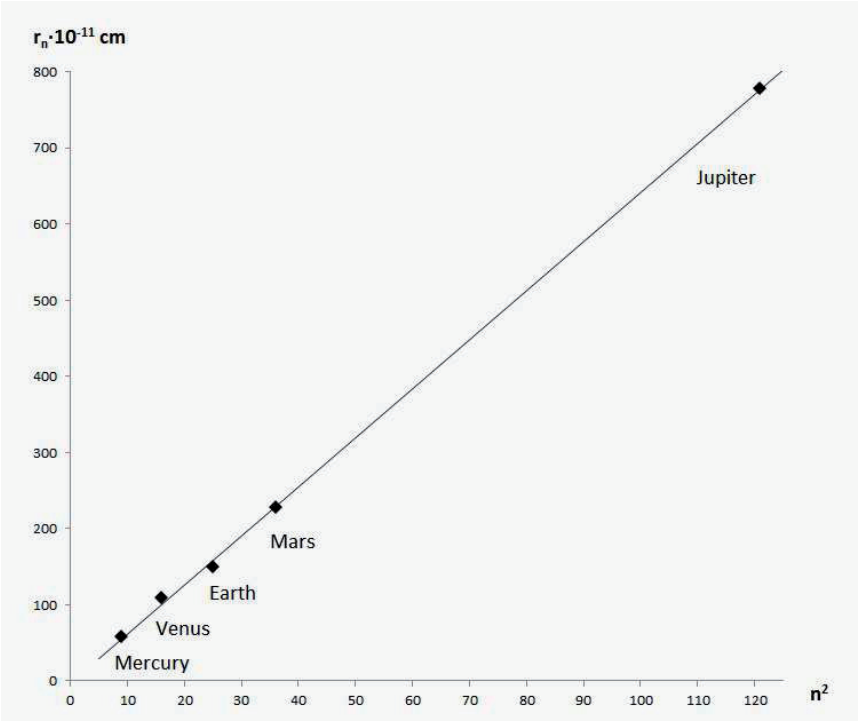

Fig.1. The dependence of the orbital distances r_n in the planetary system from squares of integers n

Table 2. The values of the constant k in equation (1) for the planetary system.

Planets	*Distance to Sun* $r_n.10^{-11}$ *cm*	*Integer n*	**Constant** $k \cdot 10^{-11}$**cm**
Mercury	57,9	3	6,43
Venus	108,2	4	6,76
Earth	149,6	5	5,96
Mars	227,9	6	6,33
Jupiter	778,6	11	6,43
Saturn	1434	15	6,37
Uranus	2870	22	6,51
Neptune	4491	27	6,16
Pluto	5869	30	6,52

Similar calculations were done for the satellite systems of Jupiter, Saturn, Uranus and Neptune. In table 3 and Fig.2 shows the data for the satellite systems of Jupiter. The system has 63 satellites. Many rely on close orbits and were therefore combined into groups. For example, in orbits with an average distance 23813·108 cm turns 28 satellites. All of them are given one quantum number 29.

In the system of Jupiter are 32 elite orbits, which are comparable with the planetary system, where they are 30. The constancy of the constants k observed satisfactorily for all orbits except the first two quantum numbers 2 and 3. The average value of the constants k = $28{,}6\cdot10^8$ cm with standard deviation of $0.3\cdot10^8$ cm excluding the first two orbits, deviations from which are outside the statistical sample. The dependence of the orbital distances in the satellite system of Jupiter is given also in Fig.2.

Graph expressing this dependence was used to determine the values of the quantum numbers n. All experimental points, expressing the satellite or group of satellites with the same orbital distances satisfactorily fit to a straight line, as required by equation (1). Each orbital distance on the ordinate corresponds to the value of n^2 on the abscissa.

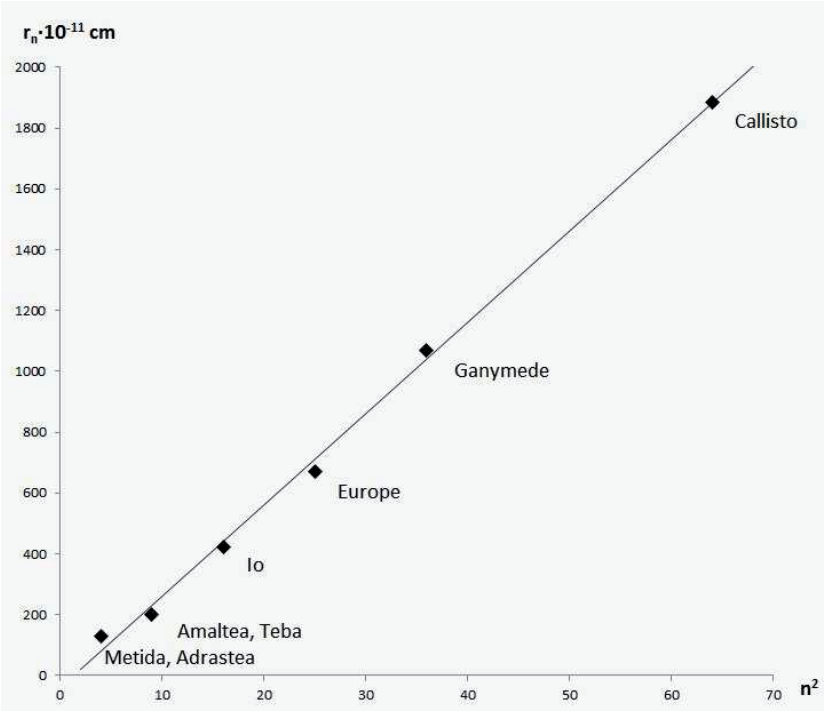

Fig. 2. The dependence of the orbital distances r_n in the system of Jupiter from squares of integers n.

Table 3. The values of the constant k in equation (1) for the system of Jupiter.

Satellites	$r_n \cdot 10^{-8}$ *см*	*n*	$k \cdot 10^{-8}$ **см**
Metida, Adrastea	129	2	32,1
Amaltea, Teba	202	3	22,4
Io	422	4	26,4
Europe	671	5	26,8
Ganymede	1070	6	29,7
Callisto	1883	8	29,4
Themisto	7284	16	28,5
A group of 5 satellites	11728	20	29,3
S/2003J12, Karpo	16450	24	28,6
Euporie	19304	26	29,6
The group of 14 satellites	20950	27	28,7
A group of 3 satellites	22808	28	29,1
A group of 28 satellites	23813	29	28,3
S.2003J2	29541	32	28,8

Table 4 presents data calculation constants k for the satellite system of Saturn. In the Saturn system there are only 47 satellites that turn on 39 elite orbits. Many of them come in close orbits. Therefore, just as in the case of Jupiter it is, they are combined into a one single orbit with one quantum number. The average value of the constants $k = 14{,}7 \cdot 10^8$ cm with standard deviation of $0.14 \cdot 10^8$ cm.

Table 4. The value of the constant k for a system of satellites of Saturn

Satellites	$r_n \cdot 10^{-8}$ *cm*	*n*	$k \cdot 10^{-8}$ **cm**
A group of 6 satellites	142	3	15,8
A group of 7 satellites	245	4	15,3
A group of 3 satellites	377	5	15,1
Ray	527	6	14,6
Titanium	1222	9	15,1
Hyperon	1464	10	14,6
Apet	3561	16	13,9
Phoebe	12944	30	14,4
A group of 4 satellites	16050	33	14,7
A group of 8 satellites	18330	36	14,1
A group of 8 satellites	19800	37	14,5
A group of 3 satellites	22500	39	14,8

The dependence of the satellite orbital distances from the squares of integers for a system of Saturn is shown in Fig. 3. In accord with equation 1 there is a linear relationship between these quantities.

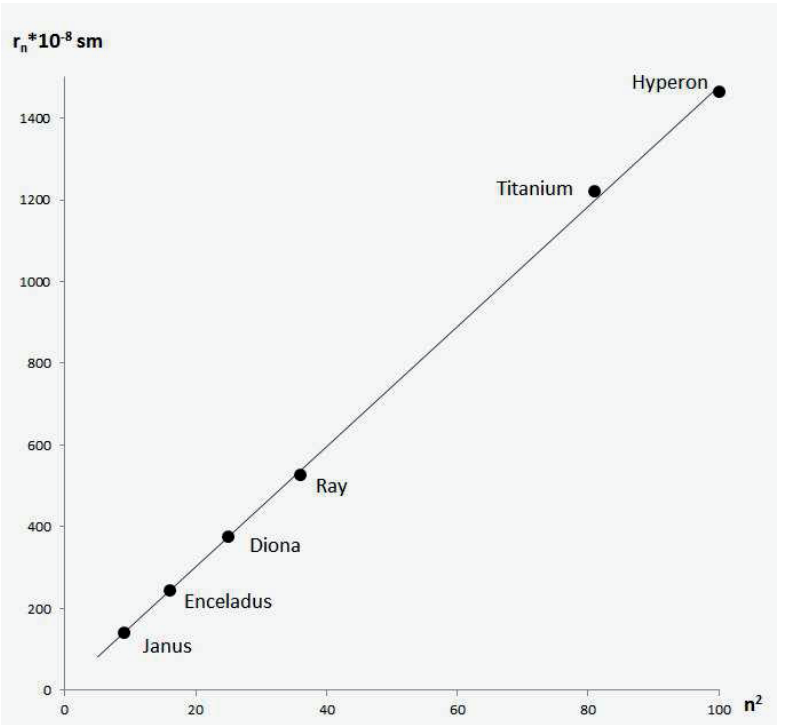

Fig.3. The dependence of the orbital distances r_n in the Saturn system from squares of integers n.

The results of the calculation of the constant k for the satellite system of Uranus are summarized in table 5. The average value of a constant is equal to $11.8 \cdot 10^8$ cm with standard deviation of $0.11 \cdot 10^8$ cm. At the calculation was not considered abnormally high value when n =2, which is outside the statistical sample. A similar phenomenon was observed when considering the system of Jupiter.

To eliminate abnormally high values of k for small n an attempt was made to modify the formula (1) by introducing into the equation an additional term, which on the ordinate axis was cut off for a certain period, and k values decreased. However, at this stage, a positive resolution of this issue could not be reached.

Graphic image of orbital satellite distances from the n^2 for Uranium system is expressed by a straight line passing through the origin of coordinate with a small deviation for small values of n, see Fig. 4.

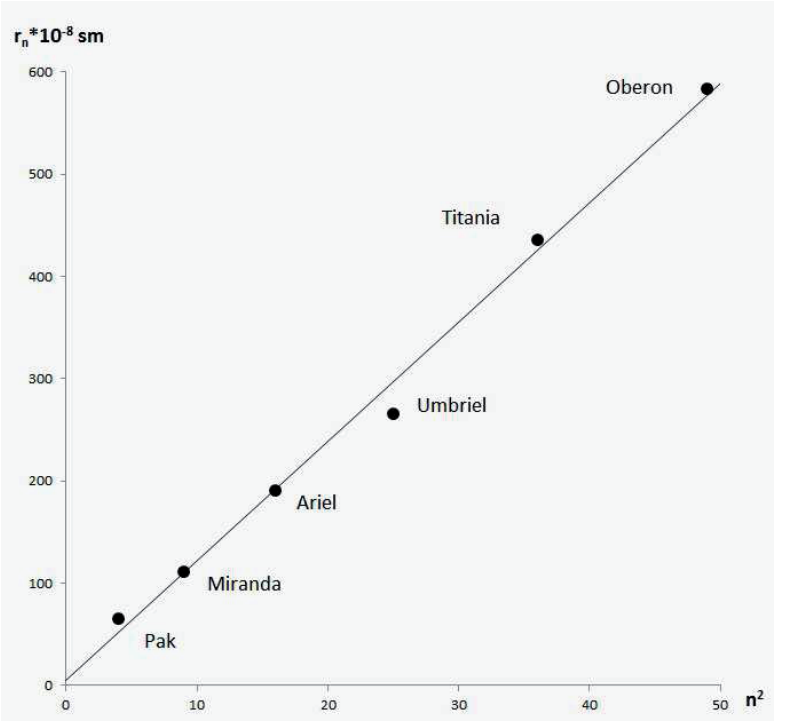

Fig.4. The dependence of the orbital distances r_n in the system Uranium from squares of integers n.

Table 5. The value of the constant k for a system of satellites of Uranus.

Satellites	$r_n \cdot 10^{-8}$ *cm*	*n*	$k \cdot 10^{-8}$ **cm**
The group of 11 satellites	64,9	2	16,2
The group of 3 satellites	111	3	12,3
Ariel	190,9	4	11,9
Umbriel	266	5	10,6
Titania	436	6	12,1
Oberon	584	7	11,9
Francisco	4276	19	11,8
Caliban	7231	25	11,5
Stefano,Trinculo	8257	26	11,8
Sycorax	12179	32	11,9
Margarita	14345	35	11,7
Prospero	16256	37	11,9
Setebos	17418	38	12,1
Ferdinand	20901	42	11,8

For satellite systems Neptune observed a similar picture. In total, the system has 13 satellites. Estimates of the constant k and the quantum numbers n are presented in table 6 and in Fig. 5. The constant k without taking into account the group of the first four satellites has an average value $9{,}85 \cdot 10^8$ cm with standard deviation of $0.11 \cdot 10^8$ see.

As in the previous cases, the first elite orbits are observed slightly overestimated values of the constants that should be the subject of additional studies. It should also be noted overestimated in comparison with other systems the number of elite orbits - 71. The Sun, Jupiter, Saturn and Uranus has respectively 30, 32, 39 and 42. This may be due to a large distance from the Sun.

Table 6. The value of the constant k for a system of Neptune satellites.

Satellites	$r_n \cdot 10^{-8}$ *cm*	*n*	$\boldsymbol{k \cdot 10^{-8}}$ **cm**
A group of 4 satellites	50,3	2	12,6
Larissa, Proteus	95,7	3	10,6
Triton	355	6	9,86
Nereid	5513	24	9,57
Halimeda	15730	40	9,83
Cao	22420	48	9,73
Laomedea	23570	49	9,82
Psemata	46690	69	9,79
Failure	48390	71	9,60

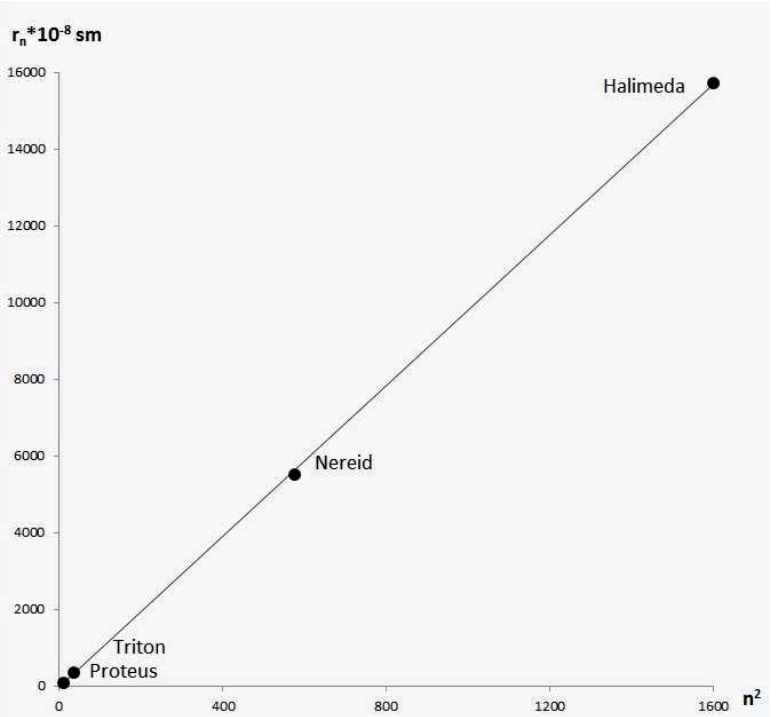

Fig.5. The dependence of the orbital distances r_n in the system of Neptune on squares of integers n.

Taking into account the opinion of Alven H. [5] about the dependence of order of the gravitational planetary systems on the rotation parameters of their central bodies, an attempt was made to establish the relationship between these parameters and the constant k in equation (1). After a large number of exploratory calculations, it was found that the most adequate for all systems the dependence of the constant k on the mass M and the rotation period T of the central bodies is expressed through the square root of the product of these quantities, i.e., through $(MT)^{0.5}$.

In other words the individual for all the considered systems, the constant k when divided by complex $(MT)^{0.5}$ to be invariant under all systems:

$$k = \varphi(MT)0.5, \qquad (2)$$

where the constant φ is constant for planetary and all satellite systems.

This is confirmed by the results of the calculation are given in table 7. The ratio $k/(MT)^{0.5}$ (constant φ) varies from $0.95\cdot10^{-8}$ to $1.61\cdot10^{-8}$ cm/g $^{0,5}\cdot s^{0,5}$, while the

constant k, respectively, in the range from $9{,}85 \cdot 10^8$ to 6280·108 cm. Thus, we can assume that the constant k and, accordingly, planetary and satellite distances r_n really depend on the parameters of the rotation of the central bodies, their mass and the rotation period. And this dependence is adequately expressed by the formula (2).

Table 7. The relationship between the constant k and the rotation parameters of the central bodies of planetary and satellite systems.

System	$k \cdot 10^{-8}$ *cm*	$(MT)^{0,5} \cdot 10^{-16}$ $g^{0,5}s^{0,5}$	$\varphi = k/(MT)^{0,5} \cdot 10^8$ $cm/g^{0,5}s^{0,5}$
Sun	6280	6600	0,95
Jupiter	28,6	26,0	1,10
Saturn	14,7	14,8	0,99
Uranus	11,8	7,31	1,61
Neptune	9,85	7,33	1,34

Some inconstancy φ (standard deviation reaches of $0.12 \cdot 10^{-8}$ with an average value of $1.2 \cdot 10^{-8}$ $cm/g^{0.5}s^{0,5}$, (coefficient of variation equal 10%.), apparently, due to the fact that in the calculations used the reference values of the periods of rotation of the liquid-gas central bodies, which are determined by moving their surface layers. Then as in the formula (2) by definition, refers to the rotation of the central body as a whole.

Only solid planet Earth and Mars have the exact value of the rotation period as a whole. But a satellite systems of these planets are not developed and does not allow sufficient accuracy to determine the constant k, and calculate the rotation parameters true value of a constant φ. Nevertheless, with that said the quantitative dependence of the orbital distances, expressed by equations (1) and (2) seems to be quite probable.

In conclusion, let us compare the results obtained in this article with the data of F.A. Gareev [4], which are shown in table 1. As already noted, they were received of the quantum constant, stable consistency within individual systems, but very different (5 orders of magnitude) between systems. It turned out that the quotient of these constants proposed in this work ин complex $(MT)^{0.5}$, taking into account the mass and the speed of rotation of the central body has an approximately constant value, see table 1. Its average value $0{,}065 \cdot 10^{-22}$, with standard deviation $0{,}026 \cdot 10^{-22}$ $km \cdot g^{-0,5}/s^{-1,5}$.

Thus, the proposed complex, which represents the square root of the product of mass on the period of rotation of the central body can be considered as universal, allowing you to compare (simulate) all satellite and planetary systems.

Conclusions

Planetary and satellite distance r_n is expressed by the equation $r_n = k\, n^2$, where n is the set of integers, k is a constant, preserving consistency within planetary or separately for each satellite system. Quotient of the constants for the complex $(MT)^{0.5}$, containing the mass and the period of rotation of the central body of the system, has a constant value of $1.2 \cdot 10^{-8}$ cm/g,$s^{0,5}$ for all systems with a standard deviation of 0.12·10-8 cm/g,$s^{0,5}$. The resulting constant is universal and can be used to calculate the elite orbits in all systems. The accuracy of the resulting universal constants can be improved, if we consider the period of rotation of the liquid-gas central body of the system as a whole

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Chapter 4. Elite orbit in the planetary and satellite systems

Summary

Formation elite orbits in planetary and satellite systems associated with the rotation of the central body of the system. Rotation of the central body causes the transverse oscillatory motion of the surrounding gravitational field, in which alternating concentric zones with predominant tangential and radial orientation of the gravimagnetic force lines. In areas with tangential orientation the orbital body during its movement does not intersect the force lines and therefore does not feel the gravitational resistance and is not inhibited. Movement in these areas flows steadily. Orbit located in the zones with tangential orientation of the power (force) lines energetically favorable, i.e. they are elite. The problem of the mechanism of formation of elite orbits considered on the basis of the analysis of the evolution of the orbits of satellites revolving around not rotating central body - the Moon (Smart-1, Moon-10) and the rotating body - Earth (Lageos-1, ISS).

The concept of elite orbits does not have a precise definition. This issue is in its infancy. Usually the term elite have in mind the most stable or stationary orbit, which are subject to a minimum of disturbing influences. Most often, the stability of orbits associated with the resonant interaction of cosmic objects, with co measurement of their movements [1, 2].

According to A. M. Molchanov "Mature oscillatory system inevitably resonance, and their structure is defined by a set of integers". In the process of evolution of the Solar system thanks to aisleriot movements and dissipative scattering of gravitational energy can achieve such an equilibrium condition in which the orbits become the most sustainable luxury.

According to B.I. Rabinovich [3] “elite orbits are at the early stages of the Solar system and planetary and satellite systems that have orbits that are close to circular, originate billionaire rings".

Further development of the problem of elite orbits is a quantum-mechanical approach to its consideration. The founder of this field, apparently, was N. G. Chetaev [4]. According to him, "sustainable can be just some of the exceptional trajectory is the same as in quantum mechanics sustainable only exceptional orbits of electrons". The use of "e-electronic" analogy opens a wide range of methodological possibilities for addressing elite orbits, in particular the various possible mechanisms of their formation.

For atomic systems are characterized by the expression of the orbital distance R of the function:

$$R=kn^2, \qquad (1)$$

which is expressed as a series of squares of integers n or formula Niels Bohr:

$$R = (\hbar / m_e\alpha_c) \cdot n^2, \qquad (2)$$

ħ- where Planck's constant, m_e- electron mass, α_s- fine structure constant.

The existence of certain laws of planetary and satellite distances are well known. A long time to express this pattern using empirical Titius-Bode rule, according to which the orbital distances are expressed geometric progression [5]. In recent years, for this purpose is increasingly used Bohr formula (2), which provides for the quantization of the orbits. Moreover, the integer n is regarded as the principal quantum number. Significant contribution to the development of quantum-mechanical approach contributed AM Chechelnitsky [6] and FA Gareyev [7]. In the paper of Gareev for orbital distances in planetary and satellite systems provides a quantum-mechanical expression of the form:

$$R = (\hbar 2 / GMm^2_G) \cdot n^2, \qquad (3)$$

where ħ- Planck's constant, G- gravitational constant, M is the mass of the central body, m_G- scale factor having the dimension of mass.

It has previously been shown [8] that the orbital distance in a planetary and satellite systems are expressed by equation (1), but the constant k depends on parameters of rotation of the central body. If the constant k, which has its own individual value for each system, normalized by the complex $(MT)^{0.5}$, where M and T is the mass and period of rotation of the central body, it becomes invariant to all systems, and has an average value $\varphi = 1\ 20 \cdot 10^8$ cm / g · s. Equation (1) become a form which is suitable for calculating R for all planetary and satellite systems:

$$R = n^2\varphi\ (MT)^{0,5} = n^2\ (GMT / C)^{0,5}, \qquad (4)$$

Here $\varphi = (G / C)^{0,5}$, where C - a constant value having the speed dimension, cm / s. Equation (4) establishes a relationship between the distance to the elite orbits of the planetary and satellite systems, the gravitational constant, mass and period of rotation of the central body, as well as the constant C, which has the dimension of speed, the physical meaning of which will be discussed later.

The very fact that the orbital distances depending on the parameters of rotation of the central body gives grounds to assume that the central body rotation sets its orbital distance. For example, the increase of rotation period or the mass of the central body at certain values of the quantum number n leads to increases the orbital distances. It can be assumed that such an effect on the central body formed by them or planetary satellite system materializes through the central body created by the gravitational field and the changes in this field caused by the rotation of the central body.

From equation (4) implies that an increase in the period of rotation of the central body T the distance R from the orbit to the central body increases and the limit is equal to infinity. This implies that no rotating or slowly rotating central body can have any satellites. This conclusion is consistent with the known facts. Moon, Venus and Mercury have no natural satellites, and the length of time in their orbit satellites is very limited: 0.5-1.5 years for the "Luna-10" and "Venus-15". The question naturally arises about the causes of this phenomenon, the formula (4) only states the fact, but says nothing about the mechanism of the phenomenon. In this paper substantiates the hypothesis of an increased gravitational resistance to movement of satellites around the non-rotating central bodies and related abnormally high acceleration satellites.

2. The mechanism of elite orbits formation

In this paper puts forward and substantiates the hypothesis of the mechanism of elite orbits formation according to which the rotation of the central body due to the shear deformation of the gravitational field around the body of a transverse oscillatory motion with areas of tangential (concentric) and the radial orientation of the field force lines. Orbital motion of the body in a tangential orientation occurs without crossing the force lines and the energy consumption to overcome gravitational resistance. These zones are the elite orbits. When the orbital motion of the body in a radial oriented field lines body undergoes maximum gravitational resistance and rapidly decelerated to lower elite orbit. Energy for overcoming the gravitational resistance released as gravitational radiation and dissipates into the surrounding space.

Consider the problem of quantization of energy in the transition from one to another elite orbit, the potential lower. The transition orbiting body from orbit R_1 to a lower altitude R_2 accompanied by a change of the potential and kinetic energy ΔE_p ΔE_k in the amount of:

$$\Delta E_p = GMm / R_1 - GMm / R_2 = GMm (1 / R_2 - 1 / R_1), \quad (6)$$

$$\Delta E_k = 0{,}5mv_2^2 - 0{,}5mv_1^2 = 0{,}5m (GM / R_2 - GM / R_1) = 0{,}5GMm (1 / R_2 - 1 / R_1). \quad (7)$$

From the equations (6) and (7) shows that the transition from orbit R_1, to a low-grade orbit R_2 in the kinetic energy is converted only $0{,}5\Delta E_p$. The second half of the potential energy remains unspent and serves as an energy barrier between the two elite orbits. This is one of the consequences of the known virial theorem R. Clausius. In atomic systems, this barrier is overcome by emission of a quantum of electromagnetic energy in the transition of an electron from one permitted orbit to another.

Given the formally identical energy dependence, we can assume that the same mechanism occurs in gravitational systems. And then get up the sacramental question of gravitational radiation and the possible existence of permitted (non-emitting) and unresolved (radiating) orbits. The second of them have not yet found a satisfactory solution for atomic systems. Addressing these issues in our opinion related to the problem of deformation of the gravitational field due to the rotational movement of the central body of the planetary or satellite system.

Consider the features of the gravitational field of a body rotating around its own axis and a not rotating body. We note immediately that this is a rotation around its own axis and not as a result of planetary motion around a central body. The gravitational field can be represented as power lines or tension lines symmetrically starting from the center of the body.

At the translational motion of this body the gravitational field moves with the body without any change. This is not be said about the rotational motion. Because the deferent speed with increasing radius the gravitational field is subjected shear deformation. Shift lasts as long as the elastic forces of the field did not stop it and cause relaxation of the field. The cross-oscillatory motion of field begins. Since the rotational motion of the body is carried out continuously, the fluctuations recorded in the form of "standing" bulk shear wave. In other words, at different distances from the surface of the body field has a different orientation of its tension liens.

Radial orientation, which is characteristic of non-rotating body, is alternating with tangential (concentric) orientation. Areas with concentric orientation of gravitational field have no or minimal resistance to motion of orbiting bodies. This is - permitted, elite orbit.

Let us explain this mechanism of formation of elite orbits by the graphic diagram in Figure 1. The central body (1) under its rotation causes shear deformation of the surrounding gravitational field, which is illustrated by bend of the force lines

(2). At the point A of maximum amplitude is reached. Under the influence of elastic forces the field oscillates, passing through the point of phase change in the maximum deflection at point C and then phase change happens at the point D.

The figure shows that in the areas of phase change of the oscillatory motion is observed mainly concentric orientation of the force lines. Passing through the circumferential area (3, 4 and 5) correspond elite orbits. When driving orbiting bodies in these orbits occur minimum intersection power lines or crossing at a small angle, which is accompanied by minimal gravitational resistance.

Region disposed between the phase change points, especially in the areas of maximum amplitude have a maximum radial orientation and respectively, the gravitational greatest resistance to the motion of orbiting bodies. This is the energy barrier, which is implemented in overcoming the second half of the potential energy of what was said earlier.

Confirmation or refutation of proposed mechanism formation of elite orbits can be data on the orbital motion of satellites around the rotating and non-rotating central bodies such as the Earth and Moon. Satellites of rotating central bodies should experience less gravitational resistance and will not rotate slower than the satellites in non-rotating bodies, where the orientation should be strictly radial.

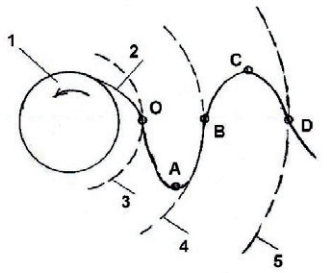

Fig.1. The scheme of elite orbits formation: 1 - rotating central body, 2 - shear deformation of the force lines of the gravitational field, 3, 4, 5 - elite orbit, A and C is the maximum deviation of the power line corresponding to the maximum radial orientation and gravitational resistance, O and D - point of the phase change corresponding to the maximum concentric orientation of the gravitational field and the minimum resistance.

3. Gravitational deceleration of cosmic bodies

By analogy with electrodynamics force gravitational deceleration (transversal force) f can be expressed by the equation:

$$f = (v/C)^2(GMm/R^2), \qquad (8)$$

where v is the orbital velocity, C is the speed of gravitational radiation (dynamic gravitational constant), G is the gravitational constant, M and m is the mass of the central and orbital body, R is the orbital distance. In the above equation for the body moving along a known orbit, contains two unknown values of f and C. the Force f can be calculated by the momentum law.

Then it becomes available to calculate the constant C, which, by definition, derived from equation (8) is the speed of gravitational radiation. For non-rotating central body, where the intersection of the power lines is at right angle, we obtain the experimental value of the constant should be the maximum and true.

The calculation of the values of f for non-rotating central body - the Moon is made according to the orbital motion of the satellite of the Moon" Smart-1" launched by the European space Agency in October 2004. On 28.02.05 to 18.07.05, (140 days) it was in a "free" flight, i.e. without the inclusion of the propulsion system. During this time, the average distance from the Moon fell from $3{,}413440.10^8$ to $3{,}402511.10^8$ cm. Respectively, the orbital speed of the satellite is increased from $1{,}198424.10^5$ to $1{,}200470.10^5$ cm/sec

. The average force of gravitational deceleration (transversal force) on the momentum law is equal to:

$$f = m\,(v_2-v_1)/t=0{,}367\cdot10^6\,(1{,}200470-1{,}198424)\bullet105/12{,}1\cdot10^6) = 5{,}82 \text{ din.}$$

Here m is the mass of the satellite and equal to 367 kg, v_1 and v_2 is the velocity before and after braking, t is time of flight. The speed of gravitational radiation (constant) was calculated according to previously proposed
equation (8) $f = (v/C)^2(GMm/R^2)$:

$$5.82 = (1{,}438672\cdot10^{10}/C^2)(6{,}67.10^{-8}\cdot0{,}735\cdot10^{26}\cdot0{,}367\cdot10^6/11{,}614297\cdot10^{16})$$

The obtained value of $C= 1{,}96\cdot10^8$ cm/s is close in order of magnitude to the value C= 4,63·108 cm/s, previously obtained from equation (5), which allows to make a conclusion about the identity of constants C, which is a member of both the considered equation.

On example of the evolution of the satellite orbit "Smart-1" is also confirmed the mechanism of transformation of potential energy into kinetic energy and the energy of gravitational radiation in accordance with the virial theorem, see equations (6) and (7). During the transition from orbit 3413,44 km to orbit 3402,51 km potential energy decreased by: $E_p=mgh=0{,}367\cdot106\cdot42{,}2.0{,}010929\cdot10^8= 0{,}169\cdot10^{14}$ erg. In the kinetic energy has passed only half of this value: $\Delta E_к=0{,}5\ m(v_2^2-$

v_1^2)=0,090·10^{14} erg. The second half went on gravitational braking and dissipated in the surrounding space in the form of gravitational radiation.

Similar in order of magnitude the value of the constants obtained for the satellite of the Moon "Luna-10", launched on a Moon`s orbit 03.04.66. The Satellite had a mass of m= 240 kg. In the period from 03.04.66 on 30.05.66 (t= 4,84·106 c) the average distance of the satellite decreased from 2,4215·10^8 to 2,4200·10^8 cm, Respectively, the orbital speed is increased from v_1= 1,421899·105 to v_2= 1,422339·105 cm/sec. From the momentum equation to find the average value of the braking force:f= m(v_2 - v_1)/t= 2,19 din.

Substituting in equation (8) found a value of brake force, calculate the value of the constant C, which was equal to 4, 31·10^8 cm/s. Is close enough to the value obtained for the satellite Smart-1 (1,96·10^8), and from equation of the dependence the planetary and satellite distances from the value: $n^2(MT)^{0,5}$ (4,63·10^8 cm/s).

The calculations are approximate. Therefore, none of the obtained values of C at this stage it is impossible to give preference and in the subsequent calculations we use the average value of the obtained three - 3,63·10^8 cm/s

For the case of braking satellite the Moon-10 is also confirmed by the distribution of potential energy into kinetic and gravitational energy radiation in accordance with the virial theorem. Potential energy by reducing the satellite at 1.5 km and acceleration of the lunar gravity of 83.4 cm/s^2 is equal to: ΔE_p= mgh= 0,24·10^6·83,4·1,5·10^5= 3,0·10^{12} erg. Into kinetic energy by increasing the speed potential energy was transferred: $\Delta E_к$= 0,5 m(v_2^2 - v_1^2)= 0,5·0,24·10^6(2,023050-2,021796)10^{10}= 1,5·10^{12} erg, i.e. 50%. The second half went on overcoming the gravitational resistance and dissipated in the form of gravitational radiation.

Gravitational resistance of satellites, rotating around the central body - the Earth is reduced due to partial concentric orientation of the force lines by the mechanism shown in Fig.1. Therefore, the strength of the gravitational resistance lower than that prescribed by the formula (8), involving the crossing of the force lines at right angles. To confirm this conclusion, we consider the evolution of the orbit of the satellite Lageos and the International space station (ISS)

In 1976 and 1992, NASA launched to earth orbit is close to circular with a height of ~ 6000 km satellites Lageos-1 and 2. The mass of each satellite was 411 kg. In order to avoid the influence of the magnetosphere the satellites are made of aluminum in the form of spheres with a diameter of 0.6 m. Long-term observations showed that the satellites lose height on average 2 m per year. Because the resistance due to radiation pressure is not possible to explain this reduction [9], we can assume that iis reason is the gravitational resistance. The strength of the gravitational

resistance was calculated by the equation (8). The constant is assumed 3,63·108. The resulting value of the gravitational forces of resistance equal to:

$$f= (0{,}571\cdot10^{6}/3{,}63\cdot10^{8})2(6{,}67\cdot10^{-8}\cdot0{,}598\cdot10^{28}\cdot0{,}411\cdot10^{6})/(12{,}23\cdot10^{8})2= 271 \text{ din.}$$

At the same time, the brake force is calculated by the momentum law has a much lower value:

$$f= 0{,}411\cdot10^{6}\cdot0{,}046/31{,}5\cdot10^{6}= 0{,}6\cdot10^{-3} \text{ din,}$$

That allows making a conclusion about justice put forward assumptions about the effect of rotation of the central body, the Earth, on the tangential orientation of the gravitational field, and the reduction due to this gravitational resistance. Orbit with r_n= 12230 km, which was Lageos, approaching the first elite orbit, where the maximum concentric orientation of the force lines and gravitational resistance is small.

Another example of the influence of the central body rotation on gravitational resistance can serve the evolution of the orbit of the International space station (ISS). It is on the orbit which is nearly circular at an altitude of 335 km. Its mass 206 t.Daily its orbit is reduced by 150 m

If ISS is turned around the central body with gravitational characteristics of the Earth, but no rotation around the axis, it felt the force of gravitational resistance is equal to:

$$f= (0{,}771\cdot10^{6}/3{,}63\cdot10^{8})2(6{,}67\cdot10^{-8}\cdot0{,}598\cdot10^{28}\cdot2{,}06\cdot10^{8})/(6{,}713\cdot10^{8})2= 0{,}823\cdot10^{6} \text{ din}$$

The actual braking force calculated by the law of momentum is equal to:

$$f= 2{,}06\cdot10^{8}\cdot8{,}61/8{,}64\cdot10^{4}= 2{,}06\cdot10^{4} \text{ din,}$$

i.e. even though some aerodynamic resistance at the height of 335 km actual braking force 40 times smaller than turning around a non-rotating central body.

The results of weak gravitational braking when the orbital motion around a rotating central bodies are in good agreement with known facts, that celestial body that does not have its own rotation around its axis (Mercury, Moon) or low speed (Venus), do not have satellites. Captured satellites quickly decelerate and fall on the central body. In contrast, satellites of rotating central bodies are inhibited poorly, especially when moving in orbits with a maximum shear strain of the gravitational field and, accordingly, the maximum concentric orientation of the force lines.

The bulk wave maximum deformation occurs at the equator and extends then in the equatorial plane. This explains the predominant position of the planets and satellites in the equatorial plane of a rotating central body. Here the greatest shear deformation and concentric orientation of the field and the least resistance to movement of the orbital bodies. For the same reason it is impossible the existence of polar satellites. Their orbit crosses the force lines at an angle close to 90^0. Due to the high gravitational resistance, they quickly decelerate and fall. A satisfactory explanation also receives the same direction of orbital motion with the rotation of the central bodies and synchronous rotation of the planets and the Sun.

Proposed in this paper the hypothesis about the mechanism of formation of elite orbits based on the analysis of the evolution of only four orbits of space objects and therefore can only be considered as preliminary. Will need to study much larger number of objects, to confirm, to make corrections and additions or reject this hypothesis. However, the authors expressed the hope that considered in the new ideas may be useful for the reader.

Conclusions.

1. There are three possible mechanism of formation of elite orbits. They are setting at the stage of the origin of the Solar system; arise in the process of evolution of the Solar system due to resonance motion of bodies and the associated dissipative scattering of gravitational energy or formed in accordance with the laws of atomic systems "just as in quantum mechanics sustainable only exceptional orbits of electrons" (Chetaev N.G. 1962).
2. To express the dependence of planetary and satellite distances r_n to the elite orbits is proposed the formula: $r_n = n^2(GMT/C)^{0.5}$, where n is an integer, G is the gravitational constant, M and T are the mass and the period of rotation of the central body, C is a constant equal 4,63·108 cm/s
3. Using established dependence of elite orbits distances from rotation parameters of their central bodies, hypothesis is proposed that the formation of the elite orbits associated with the rotation of the central body. The emergence of elite orbits materializes (implemented) through the influence of a rotating central body on the state of the gravitational field. Non-rotating central body has a radial orientation of the force lines of the gravitational body. During the rotation of the central body is the shear deformation of the gravitational field, causing the transverse oscillatory process. At the points of phase transition of the shear wave power lines of a field is tangential (concentric) orientation; in the points of maximum amplitude is radial orientation. Because the rotation is continuous with constant speed, the phase point

(line, area) are located at a certain distance from the central body. The orbital motion of bodies go on here without crossing the power lines and, therefore, without energy consumption. This is the elite orbit.

4. When the orbital motions of bodies go on in orbits with predominantly radial orientation of the force lines, because of the intersection of the power lines, the body experiences a gravitational resistance. The formula to calculate the gravitational resistance force f is proposed: $f= (v/C)^2GMm/r^2$, where v is the orbital velocity, G is the gravitational constant, M and m is the mass of the central and orbital body, r is the orbit radius, C is the speed of gravitational radiation, which is calculated by the given equation for the two satellites of the Moon: "Smart-1" and the "Moon-10". Were obtained respectively the values $1.96 \cdot 10^8$ and $4.31 \cdot 10^8$ cm/s , which are close to the value given in chapter 2, calculated by the equation for orbital distances.

5. The hypothesis is confirmed by the fact that the satellites revolving around non-rotating central body of the Moon, at which the force lines of the gravitational field is oriented perpendicular to the motion of the satellites, are inhibited by 2-3 orders of magnitude stronger than the satellites revolving around a rotating central body (the Earth), with tangential orientation of the force lines.

6. It is shown that in accordance with the virial theorem (R. Clausius) orbital bodies get down from one circular orbit to another circular lower orbit only half of potential energy is using to increase the kinetic energy of the body. In accordance with the above proposed hypothesis suggested that the second half is to overcome the gravitational resistance and dissipated into the surrounding space in the form of gravitational radiation.

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Chapter 5. On the nature of the magnetic field of celestial bodies, two types of magnetism

Summary

Based on the premise that the electric charges do not exist, and their functions are themselves elementary particles, due to the high density of matter in them (~ 10^{12} g/cm3) and high rotation speed (~ 10^{15} s^{-1}), the mechanism of magnetic fields are realized by shear deformation of the electrostatic (microgravity) field and the gravitational field. In the first case, there is a field with high tension, but it is effective at small distances. In the second case, the field has a relatively small tension, but extends to large distances. The first type of magnetism, taking into account the traditions, it is proposed to call electromagnetism, second – gravimagnetism.

1.Introduction.

In the previous message [1] confirmed the hypothesis of Laplace "about modification of the gravitational forces into molecular attraction forces". This modification of the gravitational interaction in microgravity due to the increasing density of matter in the elementary particles up to 10^{12} g/cm3. It is remains the basic pattern of the inherent gravitational interaction between masses. In microgravity interaction force is also directly proportional to the product of the interacting masses and inversely proportional to the square of the distance between them. It only changes the constant of proportionality in the equation. In the law of gravitational interaction it is equal $6{,}672.10^{-8}$ cm^3/gs^2. In microgravity interaction $1{,}845.10^{28}$ $cm3/gs^2$, that is, in $0{,}2765.10^{36}$ times more. High value microgravity constant determines the large strength and short distance when interacting masses at the micro level.

In the same article it is shown that electric charges as an independent substance (electric fluid) does not exist. Elementary particles have the properties of charge (the formation of electrostatic force and magnetic fields, attraction, repulsion, electromagnetic radiation) by themselves, in virtue of intrinsic physical properties of high-density matter in the particles and rotational motion around its axis. Thus, formation of the magnetic field occurs in the absence of charges. This indicates the direct relationship of magnetic properties with particle mass, i.e. the source of magnetic field is rotational motion of a particle with mass. It follows that a rotating macro body (cosmic body) which mass should also have the ability to form a magnetic field.

It follows that a rotating macro body (cosmic body) with a mass should also have the ability to form a magnetic field. Due to their low density and low speed movement this magnetic field is significantly different in intensity from the magnetic fields generated at the micro level, i.e. by using the electric charges on the existing terminology or by microgravity interaction of elementary particles with a high density according to the proposed concept.

Thus, in nature there must be two types of magnetism: gravity magnetism (gravimagnetism), the source of which is the cosmic mass and electromagnetism (microgravity magnetism), arising from the movement of elementary particles having a high density mass. The consideration of these two kinds of magnetism is devoted this article.

2. The formation of magnetic fields

Magnetic properties appear only when the movement of the bodies. It equally applies to micro and macro bodies. For electromagnetism it is a generally accepted fact. In the case of cosmic bodies need further clarification. It is believed that the magnetism of the planets is caused by electric currents, which arise in a rotating conductive core of the planets. As mentioned above, there are no electric charges and therefore no electric current. Therefore, the magnetism of the planets is due to their masses, or rather the movement of their masses. This agrees well with the known fact of absence of magnetic fields in non-rotating celestial bodies (Venus, Mercury, Moon).

The rotation of the body (mass) causes deformation of the surrounding microgravity (electrostatic or gravitational) field. In most cases there is a shear deformation fields resulting normal stresses and the corresponding forces [2]. The scheme of interaction of bodies with microgravity (electric) and gravitational field are shown in Fig.1.

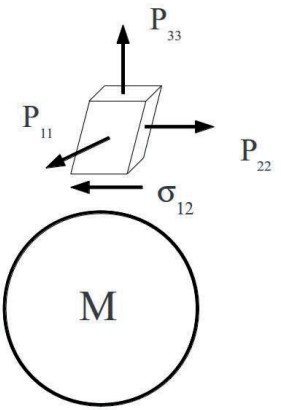

Fig1. Scheme shear deformation microgravity (electrostatic) and gravitational fields and the occurrence in them of normal stresses: M - central rotating body, σ_{12} is the shear stress, P_{11}, P_{22} and P_{33} – are normal stresses.

The central body M is rotated in the direction indicated by the arrow. On its surface acts the shear stress σ_{12}, which causes shear deformation of the field lines and, accordingly, the appearance of normal stresses p_{11}, p_{22} and p_{33}, which is shown by the vectors applied to the faces of a particle subjected to shear. The magnitude of the normal stress depends on the properties of the field. The microgravity, i.e. electromagnetic, and gravitational field have a large anisotropy. For both of them longitudinal module is significantly higher than in other directions. This is evidenced by high speed of propagation of electromagnetic (c = $1{,}998.10^{10}$ cm/s) and gravitational radiation, according to our estimates [3], is equal to C = $2{,}48.10^{8}$ cm/s. Just by this is determined a very small ratio of the magnetic and the longitudinal component of the normal stresses, i.e. by the ratio v^2/c^2, where v is the shear velocity and c is the speed of propagation of electromagnetic or gravitational radiation.

Eventually normal stress p_{11} is implemented in the form of an electric force (microgravity) and gravitational interactions (gravitation), and the normal stress p_{22} in the form of a magnetic or gravimagnetic force. Normal stress p_{33} in electrodynamics is identified with light pressure.

Moving around the circumference causes a change in the direction of the vector relative to the selected coordinate system, and the stress changes, describing when turning at 360^0 full wave. Thus, the gravitational wave as the electromagnetic is transverse. The vectors of gravity and magnetic intensity change it in mutually perpendicular planes. It is justified to call such a wave gravimagnetic. Length

gravimagnetic waves by many orders of magnitude greater than the length of the electromagnetic wave.

3. Two types of magnetism.

A significant difference between gravimagnetism and electromagnetic field follows from the hypothesis of Laplace. According to his hypothesis, the transition from gravitational forces to molecular ones the density substance increased to 10^{12} g/cm3, that is 12 decimal orders of magnitude, simultaneously accompanied by a reduction of the distance at which these forces act. Similar changes must occur with gravimagnetism forces. This means that cosmic magnetic (gravimagnetic) forces, for example, the Earth's magnetic field, the effectiveness of actions depending on the distance should be substantially different from the magnetic forces induced at the atomic (molecular) level, for example, in the coil of the solenoid. This difference is really observed.

What about this says A.Fatyanov in the article: "On the magnetic field of the Earth" [4]: "such magnets (coil solenoid 400 kW) has value of field, i.e. induction or tensions inside the magnet, and outside almost five orders of magnitude greater than the magnitude field of the Earth (the average field strength of the Earth's surface is about 0.5 Gauss) nevertheless, a few hundred meters, if not dozens, from such a magnet, the compass needle will not respond to turn on neither the off current. However, it calmly responds to the Earth's field or anomalies at the slightest change of position. What does this mean?".

The above statement confirms the existence of quantitative differences between the magnetic fields formed by the cosmic bodies and electric (microgravity) effect, that is, at the atomic level. The first is low in intensity, but is valid at large distances. Second, the induced by electric current (microgravity interaction in our terminology), is characterized by high intensity, but is effective over short distances.

This pattern confirms the genetic relationship between the gravitational and magnetic forces is expressed by the diagram in Fig.1. The purpose of delimitation of the concepts of two types of magnetic forces, it is advisable to make a terminological clarification. To denote the magnetism of the earth type, use the term "gravimagnetism" and for magnetism, induced at the atomic level, for reasons discussed in the previous message [1], it is expedient to use the term "electromagnetism".

However, these fields share common properties. They are equally responsive to the pilot solenoid or magnetic needle that points to the same origin of the magnetic field by deformation, gravity and microgravity field. Apparently, in each case has the

value of the deformation field during the rotation of the body (elementary particles, cosmic body) around its axis or orbital motion relative to the central body.

4. Closing

The above was a hypothesis about the existence in nature of two types of magnetism: electromagnetism and gravimagnetism. The main prerequisite for the formulation of this hypothesis is the evidence of absence in the nature of electric charges or electric substance (fluid). This proof was given in the previous message [1]. All the properties that give the electric charges have yourself elementary particles due to their high density (~ 10^{12} g/cm^3) and high speed rotational motion (~10^{15} s^{-1})

Therefore, the appearance of the magnetic properties at the atomic level is associated with particle mass and deformation of microgravity field created by these particles. Due to the high density and large shear stresses due to the high rotational speeds of the particles formed the magnetic field possesses high tension, but is effective at small distances.

The second type of magnetism - gravimagnetism, is generated when the rotational motion of celestial bodies (planets, Sun). Due to their relatively low density (0.7 to 5.5 g/cm^3) and low speed of rotation formed gravimagnetic field has low tension, but is effective over long distances.

Conclusions.

1. The hypothesis about the mechanism of formation of magnetic fields by shear deformation of the electrostatic (microgravity) field and the gravitational field was suggested.
2. The magnetic field generated by the deformation of the electrostatic field, has high strength, but is effective over short distances. Its induction occurs at the atomic level; it is electromagnetism.
3. The magnetic field generated by the deformation of the gravitational field, is characterized by low intensity and is induced by movement cosmic bodies. Its effectiveness extends to large distances. This field is suggested to be called "gravimagnetic", and the phenomenon of "gravimagnetism".

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Chapter 6. The repulsive force in space

Summary

Repulsive force in space has a dynamic nature. It occurs when the motion of a body with mass in the magnetic (gravimagnetism) field formed by the other body. This gravimagnetic force is similar to the electromagnetic Lorentz-Ampere force in atomic systems. The gravimagnetic force is proportional to the velocity of the moving body, the masses of the interacting bodies, the Sin of the angle between the direction of motion and power lines gravimagnetic field and inversely proportional to the distance between the bodies in the fifth degree.

1. Introduction

One of cosmological paradoxes (sometimes called the paradox of Newton) is that despite the lack of symmetric repulsive forces gravitational force of attraction did not cause the collapse of the Universe. This paradox has stimulated numerous attempts to detect cosmic force of repulsion, which in size would be commensurate with the gravity.

By analogy with electrical phenomena, the emergence of cosmic repulsive forces associated with the intrinsic properties of matter (mass) to have anti-gravity. Popular online Wikipedia defines "anti-gravity as a counter until complete extinction or even exceed the gravitational attraction by the gravitational repulsion". The repulsion may be, for example, due to the interaction of hypothetical eponymous gravitational charges. Unfortunately the latter has not been observed, and the phenomenon of anti-gravitation while only applies to science fiction.

Another possible origin of cosmic force of repulsion can be gravimagnetic force arising in dynamic interaction with the gravitational (gravimagnetic) field of the moving body by analogy the appearance of the Lorentz-Ampere force in electrodynamics.

2. Gravimagnetic force

In accordance with the concept developed in this book when a body moves in a gravitational field is the shear strain field arising in it normal stresses and the corresponding forces. The scheme of interaction of bodies is shown in Fig.1. The central body M is rotated in the direction indicated by the arrow. On its surface acts the shear stress σ_{12}, this causes the shift of the field lines and, accordingly, the

appearance of normal stress p_{11}, p_{22} and p_{33} take place, which are shown by the vectors applied to the faces of a particle subjected to shear. Ultimately, by analogy with the electromagnetic field normal stress p_{11} is implemented as strength of the gravitational interaction (gravity), and the normal stress p_{22} as gravimagnetic force.

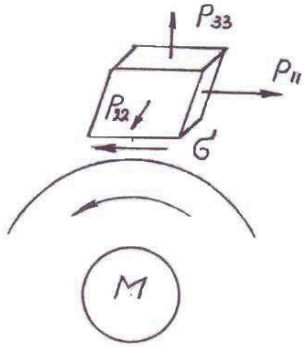

Fig1. Scheme shears deformation of the gravitational field and the occurrence in it of normal stresses.

In the previous message [1] confirmed the hypothesis of Laplace "about modification of the gravitational forces in a molecular" with the increase of density of matter in the elementary particles up to 10^{12} g/cm3. According to the hypothesis of Laplace transition from gravitational forces to molecular happens when density of substance increased to 10^{12} g/cm3, that is 12 decimal orders of magnitude. Simultaneously this accompanied by a reduction of the distance at which these forces act. Similar changes must occur with gravimagnetic forces. This means that cosmic magnetic (gravimagnetic) forces, for example, the Earth's magnetic field, the effectiveness of actions depending on the distance should be substantially different from the magnetic forces induced at the atomic (molecular) level, for example, in the coil of the solenoid.

And this difference is indeed observed. What about it says in the article: "On the magnetic field of the Earth" A. Fatyanov [2]: "such magnets (coil solenoid 400 kW) has value of field (i.e. induction or tension) inside the magnet and outside almost five orders of magnitude greater than the magnitude of the Earth's field (average field strength of the Earth's surface is about 0.5 Gauss) nevertheless, a few hundred meters (if not dozens) of such a magnet, the compass needle will not respond to turn on neither the off current. However, it calmly responds to the Earth's field or anomalies at the slightest change of position. What does this mean?".

The above statement confirms the existence of large differences between the magnetic fields formed by the cosmic bodies and electric interaction, i.e. at the atomic level. Although both of them the same nature is. The first is low in intensity, but is valid at large distances. Second, the induced by electric current (rather by a mass with a high density of 10^{12} g/cm3), is characterized by high intensity, but is effective over short distances. This pattern confirms the genetic relationship between the gravitational and magnetic forces is expressed by the diagram in Fig.1.

The purpose of two concepts types' delimitation of magnetic forces, it is advisable to make a terminological clarification. To denote the magnetism of the earth type, use the term "gravimagnetism" and for magnetism, induced at the atomic level, to apply the term "electromagnetism».

Gravitational and gravimagnetic force, as it follows from the scheme shown in Fig.1 have the same nature. The gravimagnetic strength lays normal stress p_{22}, which has two symmetrical components applied to the both side edges of the elementary volume. Possibly, these components form closed curves of tension, which is typical for magnetic fields. Judging by the high velocity of propagation of gravitational radiation, gravitational field has a high anisotropy of properties, and normal stress p_{11} underlying gravitational force of gravity, is substantially outweighed by the value of the normal stress p_{22}, responsible for the emergence of gravimagnetic force. This finding is consistent with formula (1).

By analogy with electrodynamics the gravidynamic (gravimagnetic) power o F_{gm} can be calculated by the equation recommended for determination the Lorentz force [3]. In relation to the interaction of mass, this equation can be written:

$$F_{gm} = (v^2/C^2)\, GM_1M_2/R^2 \mathrm{Sin}\alpha, \qquad (1)$$

where: v is the orbital velocity, C is the speed of propagation of gravitational radiation, G is the gravitational constant, M_1 and M_2 the masses of the interacting bodies, R is the distance between bodies, α - the angle between the direction of force lines gravimagnetic field and the orbital motion of the body. The derivation of the formula (1) in relation to electrodynamics the Lorentz force is given in [3].

In electrodynamics the Lorentz force has a dynamic origin. It appears when the charge motion, i.e. spinning elementary particles with high density [1] in the magnetic field of another particle (the central body). Given that electric charges do not exist, but their role is carried out by the rotating elementary particles with high density (10^{12} g/cm3), we can assume that the motion in space of a body with mass, in the magnetic field of another body will be the induction a force, similar electrodynamics the Lorentz force. This is gravimagnetic power. Scheme of occurrence gravimagnetic forces is shown in Fig.2.

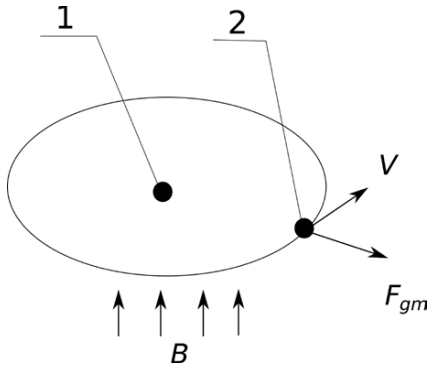

Figure 2. Scheme of occurrence gravimagnetic repulsive force in space: 1 - the central rotating body, 2 - orbital body,B- the magnetic field lines induced by the central body, v is the velocity of the orbiting body, F_{gm} - gravimagnetic power.

The Rotating central body (1) creates a magnetic field. The orbital body (2) moves with velocity v. The motion of a body in a magnetic field induces gravimagnetic force F_{gm}, which is directed perpendicular to the motion of the orbiting body and the magnetic field lines and is a force of repulsion.

It is clear that when you change the direction of motion of a body or a magnetic field gravimagnetic force is centripetal and to add the force of gravity. Apparently, this explains the dual behavior "Pioneers" that in different parts of the gravitational fields showed that positive and negative additional (beyond the Newtonian) acceleration.

Gravimagnetic power F_{gm} is proportional to the ratio v^2/C^2, and since C >> v, then it must be very small compared to the force of gravity. Its value also depends on the angle Sinά under which the moving body crosses the power line. The maximum value gravimagnetic force is observed at the intersection of the force lines at the angle of 90^0, when Sinά=1. This situation occurs only for non-rotating bodies. At rotating bodies the force lines substantially concentrically oriented and their intersection is at an acute angle, which leads to a significant reduction gravimagnetic force.

3. The repulsive forces of the Moon and Earth

Reliably established [4] that the Moon is receding from the Earth at 3.8 cm, and the Earth from the Sun at 15 cm per year. Explain this phenomenon tidal friction or some other less likely causes: change the gravitational constant, speed of light and

other factors. A more likely cause of this phenomenon in our opinion is gravimagnetism, which can induced when the orbital motion of bodies in a magnetic field of the central body. The above formula (1) allows estimates this.

In addition to the formulas (1) gravimagnetic force F_{gm} can be calculated by the equation of the 2nd Newton's law (2), since we know the mass of the Moon, $7{,}35.10^{25}$ g and Earth $5{,}976.10^{27}$ g, the time and the magnitude of their movement:

$$F_{gm} = am, \qquad (2)$$

where F_{gm} - gravimagnetic repulsive force, m is the mass of the orbiting body, and a is acceleration.

The acceleration can be calculated by the equation for uniformly accelerated rectilinear motion without initial velocity:

$$a = 2s/t^2, \qquad (3)$$

where s is the displacement (path) respectively for the moon 3.8 cm and for the Earth 15 cm, t is the time of the moving $31{,}56.10^6$ s. Substituting these values in formula (3), we obtain the values of the gravimagnetic accelerations, respectively, for the Moon $0{,}7630.10^{-14}$ and Earth $3{,}012.10^{-14}$ cm/s^2. By the formula (2) calculate the gravimagnetic force of repulsion, causing the destruction of the Earth and the Moon from the central bodies. For the Moon this force is equal $5{,}608.10^{11}$ din, for the Earth $1{,}71.10^{14}$ din.

Now compare the obtained results with the calculated values according to the formula (1), quantitatively reflecting the phenomenon of gravimagnetism. Since the orientation angle of the force lines α is unknown, we perform the first calculation for the case when the orbiting body crosses the force lines at right angles, i.e. for Sinά = 1.

Substituting in the formula (1) the orbital velocity of the Moon v = $1{,}023.10^5$ cm/s, the speed of gravitational radiation C = $2{,}32.10^8$ cm/s, the gravitational constant G = $6{,}672.10^{-8}$ cm3/gs^2, the mass of the Earth M_1 = $5{,}976.10^{27}$ g, the mass of the moon M_2 = $7{,}35.10^{25}$ g and the distance from the earth to the moon R =$3{,}844.10^{10}$ cm, find the value of gravimagnetic repulsing force when the radial orientation of the force lines, that is, when $\alpha = 90^0$ F_{gm} = $3{,}855.10^{20}$ din. Substituting in the formula (1) the previously calculated value F_{gm} by the formula (2) for removal the Moon from the Earth define Sinά = $0{,}1455.10^{-10}$. Where we can find the angle between the direction of motion of the moon and power lines gravimagnetic field α = $8{,}366.10^{-10}$ degrees.

Similarly, run a calculation to removal the Earth from the Sun, using the following parameters: the orbital velocity of the Earth v = $20{,}77.10^5$ cm/s, the mass of

the Sun $1{,}989.10^{33}$ g, the mass of the Earth $5{,}976.10^{27}$ g, the distance from the Earth to the Sun $1{,}496.10^{13}$ cm. The value of gravimagnetic repulsing force when the radial orientation of the force lines is equal of $5{,}811.10^{23}$ din, Sinά = $0{,}2928.10^{-10}$. The angle between the direction of motion of the Earth and gravimagnetic power lines $1{,}703.10^{-10}$ degrees.

As the Moon and the Earth turning on elite (allowed) orbits with a high degree of concentric orientation of the force lines that provides moving without crossing power lines and, accordingly, without consumption of energy by radiation. The data obtained above a small angle between the direction of motion of orbiting bodies (Moon, Earth) and gravimagnetic power lines confirm these feature elite orbits.

4. The dependence of the repulsive forces from the radius

From the formula (1) at first glance, it follows that gravimagnetic repulsive force grows quadratically with decreasing radius. But it's not so. For example, in atomic systems with similar quantitative dependencies repulsive force decreases when the radius increases in proportion to the radius of the fifth degree [1]. Steeper increase the repulsive forces caused by the dependence of the orbital velocity v and Sinά on the radius. Consider the question in more detail.

By analogy with atomic systems in accordance with our concept we will consider the motion of a body in its orbit as the mass flow (like an electric current) and is applicable for evaluating the emerging repulsion forces of Ampere law expressed by the formula:

$$F = IBl \sin\alpha. \qquad (4)$$

where F is the Ampere force, acting on a segment of a conductor of length l with the power of mass flow I (like a force of an electric current) in the magnetic field B. The intersection of the tension lines occurs at the right angle, so Sinα = 1. As element of l the length circumference is taken (round orbit) 2πR. The question about the possibility of a quantitative description of the repulsive forces by the laws of the Lorentz-Ampere solved if you install the dependence of the force F in equation (4) from the radius of the atom. The following is the analysis of this dependence.

The magnetic field tension B according the law of Biot-Savart-Laplace is expressed by a value proportional in our case, the power of mass flow I and inversely proportional to the square of the radius R:

$$B = k I /R2, \qquad (5)$$

where k is the proportionality coefficient.

The force of mass flow I will determine based on the following considerations. Each revolution of the orbital body through the cross-section of the orbit will be transferred mass m equal to the mass of the orbiting body. Per unit of time will be moved mass of nm, where n is the number of orbital revolutions of a body in orbit per unit of time. As the force of the mass flow I is numerically equal to the mass transferred per unit of time, the rotating orbit of the body is equivalent to the mass flow power:

$$I = nm. \qquad (6)$$

The number of revolutions $n = v/2\pi R$, where:

$$I = vm/2\pi R, \qquad (7)$$

Given that the orbital speed of a body is inversely proportional to the square root of radius $v \sim 1/R^{0,5}$, the equation for the force of mass flow will receive:

$$I = k_2 m/2\pi R^{1,5}, \qquad (8)$$

Substituting the obtained value of the mass flow in equation (5), we obtain a refined expression for the magnetic field tension depending on the radius:

$$B = k_3 m/2\pi R^{3,5}, \qquad (9)$$

After the transformation, we have refined the force values of mass flow I in equation (8) and the magnetic intensity B in equation (9). Substituting these values into the equation force (in this case, the mass flow) Ampere (4), we find that it, i.e. the repulsive force varies inversely proportional to the radius of the fifth degree:

$$F_{gm} \sim 1/r^5, \qquad (10)$$

Thus, based on the classical electrodynamics views without using the idea of repulsion due to antigravity, we have shown that when approaching cosmic bodies

between them, a force of repulsion, the value of which is inversely proportional to the distance between the bodies in the fifth degree.

Conclusions.

1. The origin of cosmic force of repulsion is gravimagnetic force arising from the dynamic interaction of a moving body with a gravitational field, by analogy the appearance of the Lorentz- Ampere force in electrodynamics.
2. Gravitational and gravimagnetic forces have the same nature. On the base of gravimagnetic force lays the normal stress appearing at the shear strain of the gravitational field. It has two symmetrical components applied to the side edges of the elementary volume. These components form closed curves of tension, which is typical for magnetic fields.
3. Removing the Moon from the Earth is 4 cm and the Earth from the Sun at 15 cm per year due to the action gravimagnetic forces. These forces are very small due to high concentric orientation of the force lines in the elite orbits. Quantifies the angle of this orientation is given.
4. It is shown that the repulsive force varies inversely proportional to the radius of the fifth degree.

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Chapter 7. Gravitational radiation and its detection

Summary

It is described two types of gravitational radiation due to the shear strain gravitational field during the rotation of the body and its orbital motion. Shear deformation of the gravitational field has two components of the normal stress perpendicular to the direction of propagation of gravitational waves G and B These are the vectors of gravitational and gravimagnetic tension. During the rotation or orbital motion of the body around the circumference at 360^0 there is a change of direction vectors in relation to the selected external coordinate system, and the magnitude of the vectors tensions describes a full wave.

The radiation energy of the rotation body is connected with the secular deceleration of the rotation speed of the cosmic bodies. The radiation energy at the orbital motion of bodies due to decrease of potential energy of an orbiting body by the transition to low-grade orbit. Energy transformations associated with gravitational radiation, are considered on the example of the orbit evolution of the Moon satellite Smart-1.

1. Introduction

Typical common definition of problems usually sounds like this: gravitational radiation is the radiation of gravitational waves by bodies (masses), moving with variable acceleration. The General theory of relativity (relativistic theory of gravitation) A. Einstein predicted the existence of perturbations of the gravitational field, gravitational waves propagating in vacuum with the speed of light. Unlike electromagnetic radiation energy gravitational radiation is inversely proportional to the distance in the fifth degree, whereas in electrodynamics in the third degree. This difference is explained by the quadrupole radiation of gravitational waves.

"In a powerful gravitational fields generated massive space objects, space-time is curved very much. And if such an object makes oscillatory or rotational motion, the curvature changes. The distribution of these changes (perturbations) in the space creates "waves of curvature", which received the name of gravitational waves" [1].

In the proposed work is based on the concept (see Chapter 1), according to which the gravitational field is treated as elastic-viscous body. When the periodic strain field due to rotation or orbital motion of bodies occurs shear deformation (perturbation field) happened, which is distributed in space in the form of gravitational waves.

2. Two types of gravitational radiation

Formation of gravitational waves can be imagined as follows. Shear deformation of the gravitational field shown in Chapter 6 in Fig.1. Two components of the normal stress perpendicular to the direction of propagation of gravitational waves will be denoted by G, and B are the vectors of gravitational and gravimagnetic tension. During the rotation or orbital motion of the body around the circumference there is a change of direction vectors in relation to the selected external coordinate system. When turning at 360^0 the value of tensions describes a full wave. Oscillation of the intensities of the G and B is similar to the electromagnetic radiation in mutually perpendicular planes.

Deformation of the gravitational field with the rotation of the body around its axis and orbital motion are significantly different from each other. Therefore, it is correctly to say that there are two kinds of gravitational radiation.

During the rotation of a celestial body about its axis to strain exposed edge ("wall") layer of the field, this rotates together with the body. In this layer there is a velocity gradient. In the area immediately adjacent to the body surface speed equal to the linear speed of the surface of the body. It then decreases in a logarithmic law down to zero. Due to the difference in the rate is the shear deformation of the border layer of the field and in full circulation of the body of the vectors of gravity and gravimagnetic tensions describe the full wave cycle. The scheme of formation of gravity waves in the rotating body shown in Fig.1.

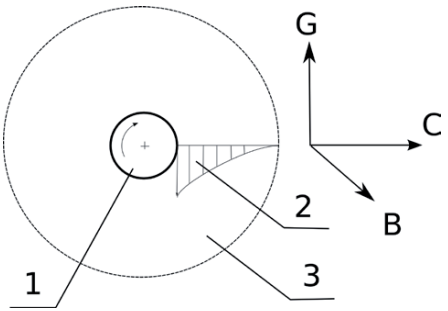

Fig.1. Scheme of gravitational radiation during the rotation of a celestial body: 1 - rotating body, 2 - velocity profile in the boundary layer of the gravitational field, 3 - zone concentric orientation of the field lines, v is the linear velocity, G and B - vectors of gravity and gravimagnetic tension, C- the direction of propagation of gravitational waves.

It is important to note that due to the large curvature of the surface the propagation of gravitational waves will occur with the rapid decrease of its intensity, so that a relatively small distance from the body surface, the intensity almost fades out.

This type of radiation is of great importance for the formation of elite orbits, i.e. orbits, the movement which an orbital body occurs without energy consumption, without radiation. Formation of such orbits discussed in Chapter 4. The velocity gradient in a rotating layer of the field leads to a concentric orientation of the field lines, in which the movement of the body in an orbit occurs without crossing power lines and radiation.

Another form of gravitational radiation occurs when the orbital motion of the celestial body. Its scheme is shown in Fig.2. Around the central body (1) with mass M_1 along the orbit (2) moves the orbital body (3). However, there are two cases: 1 - the central body is motionless, 2 - central body rotates about its own axis.

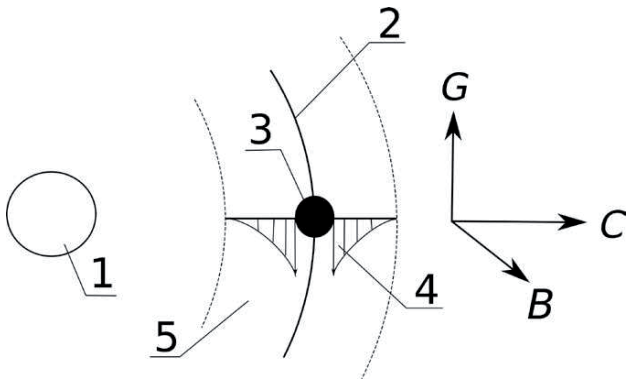

Fig.2. Scheme of gravitational radiation during the orbital movement of the body: 1 - the central body, 2 - the trajectory of the orbit, 3 - orbital space body, 4 - velocity profile, 5- area of high orientation of the force lines, G and B - the tension vectors of gravity and gravimagnetic, C - velocity vector of gravitational radiation.

In the first case, the force lines extend from the central body radially, and the moving orbiting body crosses them at the right angle. In accordance with equation Lorentz-Ampere (1) it is the maximum resistance and radiates maximum energy.

$$F_{gm} = (v/C)^2 GM_1M_2/R^2 Sin\acute{a}, \qquad (1)$$

where v is the orbital velocity, C is the speed of gravity, G is the gravitational constant, M_1 and M_2 is the mass of central and orbital body, R is the orbit radius, α is the angle at which the orbiting body crosses the power line. When the radial location of power lines $Sin\acute{a} = 1$ the gravimagnetic power F_{gm} has the maximum value and the intensity of the gravitational radiation is the highest.

In the case of a rotating central body under the action of shear stresses the power lines receive a circular orientation. The radiation in this case there is only at incomplete orientation when the intersection is at an acute angle and $Sin\acute{a} < 1$. In the

region of elite orbits the power lines are located concentrically and orbiting body moves without crossing them. The gravitational radiation in this case is absent.

3. The energy of gravitational radiation

At the getting closer of two gravitating bodies with masses m and M on the straight line connecting their centers, that is, without crossing the force lines all the potential energy of the gravity converted to kinetic. Observe the law of conservation of energy: "for mechanical system its total energy E, is equal to the sum of the kinetic E_k and potential energy E_P, remains constant". In fact, the body with mass m rose to a height h, has potential energy:

$$E_P = mgh, \quad (1)$$

where g is the acceleration of gravity.
In the fall of a body from height h, it will acquire speed:

$$v^2 = 2gh, \quad (2)$$

and its kinetic energy will increase to:

$$E_k = mv_2 /2, \quad (3)$$

Substituting in (3) the speed of (2), we obtain:

$$E_k = m\ 2gh/2 = mgh, \quad (4)$$

i.e., the potential energy is fully transferred into kinetic energy. This happens when the free fall of the body without crossing the gravitational force lines.

The situation is different when the orbital motion. Orbital moving body crosses radially spaced lines of force, experiencing gravitational resistance, and part of its energy is going on the radiation.

In accordance with the virial theorem R. Clausius for bodies that interact inversely proportional to the square of the distance, the decrease in potential energy E_P is equal to twice the increase of the kinetic energy E_k, i.e.:

$$E_P = 2E_k, \quad (5)$$

The transition of orbital bodies orbit R_1 to a lower orbit R_2 accompanied by a change in potential of the E_P and of the kinetic energy E_k in the amount of:

$$E_P = GMm/R_1 - GMm/R_2 = GMm(1/R_2 - 1/R_1), \quad (6)$$

$$E_k = 0{,}5mv_2^2 - 0{,}5mv_1^2 = 0{,}5\ m(GM/R_2 - GM/R_1) = 0{,}5\ GMm(1/R_2 - 1/R_1). \quad (7)$$

From the above equations (6) and (7) shows that during the transition from orbit R_1 , to more low-grade orbit R_2 in the kinetic energy becomes only 0.5 E_P. The second half of the potential energy has disappeared!? She went on overcoming external forces that helped to move the body from orbit R_1 to orbit R_2. Foreign forces in near earth space are often aerodynamic resistance or the disturbing action of gravity of the third (thirds) body.

None of the literature does not mention that the external braking force can be, and is in fact, gravitational resistance caused by the intersection of the force lines of the field, and “half the potential energy is disappeared" and realized in the form of gravitational radiation.

In the paper [3] indicated that “the potential energy goes into increasing the kinetic energy of the translational thermal motion of particles of matter."

In [4] it is states that "the negative potential energy of the stars in absolute values twice as much thermal energy. This strange at first glance, the feature has a simple explanation: the star, radiating, slowly shrinks. At the compression potential gravitational energy, which is by the module twice, turns into the kinetic energy of the falling layers of stars".

Not enough clear explanation of the energy transformations in the orbital transitions is given in the course of P. Eliashberg [5]. which is very popular among practical estimator trajectory of the flight of artificial Earth satellites: "When perturbing acceleration is opposite the direction of flight, the satellite moves in a shrinking spiral. In this case, the flight speed increases, the period decreases. Such, at first sight, paradoxical nature of the movement is explained by the fact that under the action of the disturbing force increases the mechanical energy of the satellite. Perturbing force in this case is the external force which incorporate the second half of the potential energy and thus provides a transition of a satellite in low orbit, where a higher rate and a shorter period of rotation prescribed by the kinematics of the orbital motion. As an external disturbing force in this case could be any other resistance - aerodynamic, gravitational, which absorbs the second half of the potential energy equal to $mv^2/2$”.

In atomic systems, where the same inversely quadratic dependence is at the transition of an electron from one orbit to another half of the potential energy goes to

increase the orbital velocity of the electron, and the other half on the emission of a quantum of electromagnetic energy. Given formally the same energy dependence, it can be assumed that the same mechanism occurs in gravitational systems.

Orbital body, crossing the force lines of the central body experiences a gravitational resistance and braking with a corresponding change in the orbit and gravitational radiation. Thus, gravitational radiation can be judged by the evolution of the orbit, if it is not caused by other factors (disturbing effect of the third body, the resistance of the atmosphere, magnetic fields, solar wind, and others). Changing the parameters of the orbit caused by the gravitational resistance, will allow you to calculate the energy of the radiation and thus to judge the amplitude of gravitational waves radiation.

4. The detection of gravitational radiation

All existing methods for the search of gravitational waves are implemented “through appropriate force acting" [2]. The researchers are faced with the difficulty caused by the need to detect the amplitude of the oscillations to $h \sim 10^{-22}$ when their small duration (seconds).

In light of the above said ше is of interest "energy" approach to the study of gravitational radiation, in which the measured experimental values can be much larger, and the measurement to be carried out over long periods of time.

The first form of gravitational radiation generated by rotating the cosmic body, apparently, can be characterized by the slow of rotation speed. The second kind, caused by the orbital motion of the body is more convenient to study by the evolution of the orbit of the body. Below is given an example of the measurement of gravitational radiation on the change of the satellite's orbit of the Moon’s satellite Smart-1.

The proposed mechanism for the transformation of potential energy into kinetic energy and the energy of gravitational radiation in accordance with the virial theorem, see equation (5), (6) and (7) is confirmed by the example of the evolution of the orbital motion of the satellite of the Moon ”Smart-1” launched by the European space Agency in October 2004 on 28.02.05 to 18.07.05, (140 days) it was in a "free" flight, i.e. without the inclusion of the propulsion system.

. During this time, the average distance from the Moon decreased from $3{,}413440.10^8$ to $3{,}402511.10^8$ cm. Respectively, the orbital speed of the satellite is increased from $1{,}198424.10^5$ to $1{,}200470.10^5$ cm/sec. After transfer from orbit 3413,44 km to orbit 3402,51 km potential energy decreased by: $E_P=mgh= 0{,}367\cdot10^6\cdot42{,}2.0{,}010929\cdot10^8 = 0{,}169\cdot10^{14}$ erg. In the kinetic energy has passed only

half of this value: E_k=0,5 m(v_2^2-v_1^2)=0,090·10^{14} erg. The second half went on gravitational braking and dissipation in the surrounding space in the form of gravitational radiation. Exact quantitative agreement between potential and kinetic energy with the condition (1) confirms this conclusion.

The parameters of gravitational waves can be calculated by the energy of radiation, the number of turns of the satellite and the radius of its orbit. The wave amplitude is calculated by the equation:

$$E = K \times A^2 /2. \qquad (8)$$

where E is the energy, K-coefficient of proportionality, A is the amplitude. At this stage the specification of the proportionality coefficient K is unknown.

Thus, gravitational radiation can be quantitatively characterized by the evolution of the orbits of such objects, where a record of all known disturbing factors do not offer a complete explanation of the observed deviations from the law of gravitation. To these objects can be attributed the shift of the perihelion of Mercury, the acceleration of Phobos, (a moon of Mars), as well as the anomalous acceleration of the satellites Lageos and Pioneer. It may be advisable to launch a special test satellites in orbit evolution of which it is possible to study gravitational radiation.

Conclusions

1. Gravitational radiation is generated by periodic shear deformation of the gravitational field at a rotational or orbital motion of cosmic bodies. Deformation is carried out in two mutually perpendicular directions. The deformed sections are propagate in space in the form of gravitational waves
2. Gravitational energy is radiated at a rotational motion of celestial bodies. It can be characterized by centuries slow of linear speed rotation of bodies.
3. Gravitational radiation generated by the intersection of the power lines during the orbital movement of the body, accompanied by braking of the body and moving it to a more low-grade orbit. The decrease in potential energy is equal amounts get to increase the kinetic energy of the body and gravitational radiation. This ratio is quantitatively confirmed by the evolution of the orbit of the Moon's satellite Smart-1

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Chapter 8. Rings in satellite systems

Summary

It is given the relation between the distance from the planets to the rings and the rotation parameters of the planets, which is expressed as the square root of the product of the mass of the planet and the period of its rotation. It is suggested that the asteroid belt in the Solar system and the radiation belt of the Earth belong to the same group of phenomena as the formation of ring structures that happens by dynamic changes in the ambient gravitational field.

1. Introduction

For a long time the phenomenon of Saturn's rings was considered to be unique this planet. First, however, the prediction, then the opening of the rings of Jupiter, and then at Uranus and Neptune allows to make a conclusion about the universality of this phenomenon. In this paper we propose and substantiate the assumption that the formation of rings in satellite systems associated with rotation parameters of the central bodies.

2. Planetary rings

Table 1 presents data on the distances from the central body around which begins the formation of the rings R_r, the number of rings n, their width b and thickness δ. Rings are composed of particles ranging in size from a few cm to bodies in size 4-6 km, which move in orbits close to circular.

It is believed that they represent the material of unformed satellites of the protoplanetary cloud. It is clear that in this case the parameters of the satellites must be accidental. However, it is not so.

Table 1. The parameters of the rings in satellite systems

Satellite system	R_r, cm. 10^8	Number of rings, n	b, cm. 10^8	δ, cm. 10^5	$(m\tau)^{0,5}$, $.10^{16}$	$R_r/(m\tau)^{0,5}$ $.10^{-9}$	$R_r/m^{0,5}$ $.10^{-6}$
1	2	3	4	5	6	7	8
Jupiter	119,3	1	9,0	30	25,95	4,60	8,84
Saturn	71,9	7	66,4	2-20	14,48	4,97	9,54
Uranium	41,9	11	9,4	-	7,43	5,78	14,30
Neptune	42,0	3	21,0	-	8,18	5,13	13,17

Consider the question of possible relationship of parameters rings with rotation parameters of central bodies. In table 1 in columns 7 and 8 show the ratio of the distances from the central body to the beginning of rings formation R_r to the complex $(m\tau)^{0.5}$ and to the mass m of a central body. Complex $(m\tau)^{0.5}$, representing the square root of the product of mass on the period of rotation of the central body, more precisely, as shown previously, see Chapter 3, expresses a connection with the elite (allowed) orbits.

3. Rings and the rotation of planets.

From the presented data in table 1 shows that the complex $(m\tau)^{0.5}$ allows you to set a fairly close relationship between the distance at which begins the formation of the rings and rotation parameters of the central body. The ratio $Rr/(m\tau)^{0.5}$, see column 7, remains constant within +/-12%, in spite of the fact that R_r is changed in 2.8 times the mass of the central body 22 times and the period of rotation 1.9 times.

As you can physically imagine the relationship between the distance to the starting point of the rings formation with one hand, the mass and speed of rotation of the central body with the other? The simplest and most likely explanation in our view is the assumption that the rotating central body causes around itself such a change in the ambient space, which makes possible the formation of rings.

With the surrounding space of the central body is due only to the gravitational field. Therefore, rotation of the central body cause changes in the dynamics of the gravitational field, which create conditions for the formation and existence of the rings. More important are the dynamic field changes depending on the rotation of the central body, as the relationship between the R_r and the mass of the central body is much weaker.

Most likely particles rings are permitted on the zero orbit, understood in the sense as it was outlined in Chapter 3. Thus, the distance from the central body to the point of beginning of the formation of the rings is not a random variable, and the phenomenon of the formation of rings as unique as it was considered earlier.

Other parameters are the width of the zone, apparently, is based on some quantitative relationships between the parameters of the system. The maximum width is of the zone of Saturn's rings $66{,}4.10^8$ cm (see column 4). This value is sharply distinguished in comparison with the other planets of $9.0.10^8$, and $9.4.10^8$ and $21.0.10^8$ cm, respectively, Jupiter, Uranus and Neptune. Most likely the large width of the zone of Saturn's rings is connected with its distinct low density 0,69 g/cm^3 compared to the other planets. But this relationship is ambiguous.

As for the other parameters, namely the number of rings, the thickness and dimensions of the bodies constituting the ring, to assess the patterns specified with the rotation of the central body and the randomness caused by the capture of material from the surrounding space, additional analysis is necessary.

4. The universality of the phenomenon of the rings formation.

The question of the width of the zone oft the rings formation is of particular importance in relation to the planetary system, to the formation of the asteroid belt. Naturally the question arises whether the asteroid belt belongs to the phenomenon of the rings formation? If we assume that the asteroid belt begins at a distance 324.10^{11} cm from the Sun, the ratio of this value to the parameter $(m\tau)^{0,5} = 6,61.10^{19}$ is $49,0.10^{-8}$, which is close in order of magnitude and still 10 times higher than for satellite systems.

It can be assumed that the formation area of the rings in the planetary system begins closer to the central body (the Sun), say at a distance of $33.8.10^{11}$ cm, but in fact it cannot be realized due to the capture material by the planets of the Earth group. In this case, the terrestrial planets are in the area of the rings. A similar situation occurs in satellite systems. In each of them in the area of the rings are one or two small satellites, but due to the smallness of their mass they can't "out" the substance itself.

The average value of the ratio $R_r/(m\tau)^{0.5}$ for the four satellite systems equal $5,12.10^{-8}$. Taking into account this value and the corresponding values of the complexes $(m\tau)^{0.5}$ can be calculated distances, which may form a ring at the Earth and Mars. They are respectively equal to 5.13 and 0.47 thousand km from the surface of the planets. In this connection it may be noted that the Earth observed radiation belts, the first of which is located at a distance of 4.0, and the second 17 thousand km from the surface [1].Recently [2] was discover a third intermediate one. However, the values may not be of significance, since the terrestrial planets have very different density.

Thus, the rings formation in satellite systems, or at least distance from the central body at which begins the formation of the rings depends on the mass and speed of planet rotation, which can be related to changes in the gravitational field caused by the rotation of the planet.

Conclusions

1. It is obtained linear dependence with a precision of 13% between the distance from the planet to the beginning of rings formation and the complex, representing the square root of the product of the mass of the planet and the period its rotation.
2. It is suggested that the dependence of the planets rings formation due to changes in the orientation of the force lines of the gravitational field caused by the rotation of the planets.

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Chapter 9. The mass distribution of planets and satellites in the orbital radii

Summary

The distribution of masses and densities of the planets and satellites in the orbital radius is set by the distance between adjacent allowed (elite) orbits and the gravitational field tension. In orbit may not be the space body which mass or density above the given one. Due to the random nature of the capture of bodies on orbits of their mass and density may be lower than specified, which explains the absence of strict laws in the mass distribution of planets and satellites.

1.Introduction.

The existence of certain regularities in the distribution of masses of planets and satellites and their densities depending on the radius of planetary and satellite systems is no doubt. Large size of the central body has larger satellites. The mass of planets and satellites is growing, and their density decreases with increasing distance from the central body. On this basis orbital body sometimes divided into groups of inner, middle and outer ones. Internal, as a rule, are of small size and high density. Medium characterized by the highest regularity the change of mass and density. Finally, external orbital bodies inherent lack of specific laws on mass and density, as well as on the parameters of their orbits.

Regularities in the distribution of masses of planets and satellites usually deals with cosmogony, in which certain features in the distribution of masses serve as the criterion of validation of the proposed theories of the origin of the Solar system.

The most recognized idea that cosmic bodies were formed by accretion, that is, the capture substance by fluctuation centers from the surrounding homogeneous disk or cloud with jet flows under the action of gravitational or electromagnetic forces generated in the jet streams.

However, none of the extended accretion theories gives a satisfactory explanation of the differences in the chemical composition of adjacent bodies, nor the more physically based quantitative regularities of changes of the mass and density of bodies in planetary and satellite systems depending on radius.

Most clearly, the failure of pure accretion theories became apparent after analysis of the lunar soil, when it was shown that two neighboring celestial body, the Earth and Moon, which are in accordance with the theory of accretion should be the same, have different chemical composition and age. In this regard, becoming

increasingly widespread theory of planetary and satellite systems by capturing drifting in space bodies. Capture of the Moon and satellites whith the reverse movement is considered to be the most likely [1, 2].

In the below hypothesis about regularities of distribution of mass the formation of planetary and satellite systems by capturing considered as a universal mechanism, which is filling the vacant allowed (elite) orbits defined by the rotation parameters of the central bodies, and for each orbit is characterized by a limit on the mass and density of the orbiting body.

2. *The hypothesis about the distribution of mass on the orbital radius*

Formation the gravitational planetary systems occurs capturing by the central body flying from the surrounding space orbital bodies under the influence of the third body. Initial elongated elliptical orbit evolves in the circular under the action of two forces: the force of resistance orbital motion due to tidal friction and the resistance of the surrounding physical environment (physical vacuum, ether), arising from the intersection of the gravitational force lines generated by the central body.

Drag the physical environment of the moving orbital body much more effectively than previously considered (see Chapter 1) shear tangential resistance, breaking the rotation of the space bodies. Under the action of the drag of the physical environment the gradual transition of orbital body to more low-grade orbit is happen. Potential energy is spent partly at increasing speed to a lower orbit and partially goes to gravitational radiation.

Inhibition by crossing the lines of gravity occurs with different intensity depending on the orientation of the force lines. Orientation is expressed by Sinά, where α is the intersection angle of the power line. Orientation changes from radial, when Sinά = 1 and the maximum resistance, close to concentric, where the intersection of the force lines occurs at small angles and the resistance is minimal.
These are the allowed (elite) orbits. The transition from these orbits to a low-grade orbit seldom or almost never happens. At a certain combination of directions of orbital motion and gravimagnetic field (the left-hand rule) may not decrease, but on the contrary, the destruction of the orbiting body from central takes place. This case was discussed in Chapter 6 on the example of the removal of the Moon from the Earth.

The orbital movement of bodies on orbits that are closer to the central body is selectively relative masses. Orbital densities closer to the central body decreases the distance between adjacent allowed orbits ΔR and increases the tension of gravitational field. This makes it difficult to transition to the low orbit of large orbital

bodies and favors the transition of smaller mass orbiting bodies, but with high density. All this leads to the "separation" of orbital bodies mass and density and, ultimately, to a certain mass distribution along the radius.

3. The density of orbital bodies.

The allowed orbits are restricted by mass of orbital bodies and their density. At the capture the orbit may be occupied by a body with mass and density not higher than is permitted for a given orbit. At the same time, it is allowed lower mass and density. Since capture is a statistical process, i.e. mass and density of the captured solids are random variables, the planetary and satellite systems in principle, cannot be rigorous quantitative regularities on these indicators.

However, at the same time, there seems to be an exact dependence of the limit values allowed masses and densities on the parameters of the rotating central body and orbital distances. It seems reasonable to attempt to install this dependency, or at least become closer to its understanding. Efforts should be directed at the opening of this dependence, which is the key to the determination of the mass distribution of orbital bodies in planetary and satellite systems.

Consider the change of size resolved mass in cross section of a planetary (or satellite) system. It can be assumed that the maximum permissible mass of the planet or satellite M_l on the allowed orbit is proportional to the unit volume of the orbit of $v \approx hR^2$ and allowable density ρ_o on this orbit:

$$Ml \approx hv\, \rho_o, \qquad (1)$$

Unit volume of the orbit is proportional to the square of the distance between adjacent allowed orbits and selected single thickness h. Harder to ρ_o. In addition to the distance from the planet, it is difficult depends on the parameters of the central body: mass, speed of rotation and a gravitational field intention.

It seems appropriate at this stage to express this dependence through the actual dependence of the density of orbital bodies in the planetary system and the system of Jupiter, where the dependence of the density of orbital bodies ρ_o on distance to the central body R is expressed quite accurately:

$$\rho_0 = CR^{-0,5}, \qquad (2)$$

In table 1 is mapped to the density of the planets and the Galilean satellites of Jupiter with their orbital distances R in degree of 0.5. To establish a degree of

interdependence between these values was calculated correlation coefficients. There is a fairly close relationship. For the planetary system, the correlation coefficient of 0.90, for a system of Jupiter 0,91. Therefore, inversely proportional dependence of allowable density adequately is expressed by formula (2).

When capturing celestial bodies from the solar space is occurred the planetary and satellite systems play the role of a kind of sorting machines. In the case of capture the body having a high density, say 3-4 g/cm3, on the outer orbits experiencing relatively high gravitational resistance and goes to the inner orbit, where due to the high gravitational tension allowed the appeal bodies with high density at the minimum of the gravitational radiation. The bodies with a low density for a long time remain on the outside allowed orbits.

Table1. The correlation between the density of the planets and the Galilean satellites of Jupiter and its distance from the central body

Central body	Orbital body	Density of central body, g/cm^3	Distance to central body, $R^{-05}.10^{-7}$ cm
1	2	3	4
Sun	Merkury	5,43	4,15
	Venus	5,25	3,04
	Earth	5,52	2,58
	Mars	3,95	2,10
	Jupiter	1,33	1,13
	Saturn	0,69	0,84
	Uranus	1,28	0,59
	Neptune	1,64	0,47
Coefficient of correlation – 0,90			
			$R.^{10-4}$
Jupiter	Io	3,57	4,88
	Europe	2,97	3,86
	Ganymede	1,94	3,06
	Calixto	1,86	2,30
Coefficient of correlation – 0,91			

However, it should be in mind that any permitted orbit is not perfectly resolved and the braking it still happens. So even a body with a low density although slowly, but eventually move on to more low-grade orbit as long as their mass will not exceed the limit prescribed by the distance between two neighboring orbits ΔR.

Slow evolutionary changes in planetary and satellite systems, apparently, interspersed with abrupt revolutionary transformations. Gradual changes, in addition to the purely gravitational perturbations are associated with increasing mass of the orbiting bodies due to the continuously flowing accretionary processes, slowing down the rotation of the central bodies due to gravity resistance (radiation), braking of orbital bodies due to incomplete matching parameters allowed orbit mass, density, inclination and eccentricity of the orbit.

The accumulation of small changes leads to a critical state, which is accompanied by a transition to another orbit, a collision with a neighboring body or fall on the central body. There is a balance between the processes of accretion and decay of cosmic bodies/ Mass orbiting bodies is a reflection of, the cast of this balance.

Summarizing, we note that the basis of distribution patterns of orbital masses of bodies lying on the permissive principle. The rotating central body, with a certain mass and speed, sets the sizes of the orbits and gravitational tension in them, which limit the size of the orbital bodies and their density.

The filling vacant allowed orbits occur according to the mechanism of capture. Due to the random nature of this process, the exact quantitative relationship between the mass of the orbiting bodies and other system parameters is impossible. However, the mass of captured bodies cannot exceed the maximum set by the distance between the orbits and gravitational field tension.

Conclusions

1. The hypothesis, according to which the mass distribution along the radius in planetary and satellite systems is determined by the distance between the orbits and gravitational tension, is proposed. This hypothesis is confirmed by the linear dependence of the density of orbital bodies on the value of their orbital radii at the value of correlation coefficients of 0.90-0,91.
2. The absence of rigorous quantitative relationships in mass distribution associated with the random nature of the capture of orbital bodies.

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Chapter 10. On the origin of planetary and satellite systems

Summary

Summarizes the requirements that must be met for the modern theory of the origin of the Solar system. The formation of planetary and satellite systems consist of two types of processes: revolutionary and evolutionary. Among the revolutionary are quickly proceeding processes of dividing and capture of bodies. To evolutionary processes belong condensation, accretion and gradual changes of the orbits due to gravitational braking, action of disturbing forces. As a result of gradual changes is increasing in mass and size, the gravitational braking, action of disturbing forces the orbital system loses its stability and comes the stage of revolutionary change.

Celestial bodies have always existed and planetary and satellite systems were formed or broken up by recombination (capture mechanism) or disaster, related with division or fusion of the central bodies and the transition of orbital bodies into other orbits. Mechanism of accretion works between these revolutionary transformations. It is expressed in the gradual change of mass, accumulation of secular changes of the orbits, which are ultimately expressed in the "aging" of the system, the loss of its stability and transformation mechanisms of capture or fission.

1. Introduction

The formation of planetary and satellite systems is possible via three mechanisms:

- condensation (accretion) of substance scattered in the space around centers (nuclei), which of fluctuation origin have,
-the division of the primary body into two or more secondary bodies due to collision or under the influence of external disturbing forces and
- gravitational capture by the central body of one or more orbital bodies.

The first mechanism is given the most attention. It was starting with a hypothesis of Kant-Laplace on the simultaneous formation of Solar system bodies from the protoplanetary cloud and up to the modern theories of Schmidt and Alfvén that take into account the latest achievements of physics and chemistry. It should be emphasized that in these theories focus on the formation of the heavenly bodies themselves from scattered substances, while in the theories of dividing
and of capture dealing with existing bodies.

. The division mechanism is discussed for the case of the formation of the Solar system (Jeans) and the separation of the Moon from the Earth (Darwin). The theory

of the formation of planetary and satellite systems by gravitational capture is becoming increasingly important. Still a weak point of this theory was the problem of explaining the dissipation of gravitational energy. However, if we assume that the gravitational braking by analogy with electrodynamics is inversely proportional not to the fifth, but the third degree of the velocity of propagation of gravitational radiation, and that this speed is ~ $3{,}23 \cdot 10^8$ cm/s, this problem is solved.

2. Requirements of the modern theory of the origin of planetary and satellite systems

The modern theory of the origin of planetary and satellite systems should take into account, be consistent and explain the following facts:
- plane of the orbits of the planets are close or coincide with the Equatorial plane of the Sun,
- all planets revolve around the Sun in the direction coinciding with the direction of rotation of the Sun,
- most satellites of the planets is orbiting in the same direction, in which planets revolve,
- the equatorial plane of the planets can significantly deviate from the planes of their orbits (Earth 23^0, Mars 24^0, Saturn 26^0, Uranium 98^0 and Neptune 29^0),
- the planet, not having their own absolute rotational movement around its axis or with a small speed - Mercury and Venus, have no satellites,
- planetary and satellite distances to the central bodies depend on the parameters of the rotation of the central bodies,
- in the central bodies there are main part of mass of systems (the Sun 99%), but they accounted for a negligible proportion of the kinetic energy (the Sun 2%),
- the formation of rings of planets is a universal phenomenon and depends on the parameters of the rotation of planets, expressed in the form of a complex $(MT)^{0.5}$,
- there is the secular deceleration of the rotation speed of the Sun and planets. The Earth is 0,0015 s with over 100 years,
- there is a braking force of satellites out of the atmosphere, which is satisfactorily described by the Lorentz equation at the velocity of propagation of gravitational radiation $(1{,}64 \div 7{,}15) \cdot 10^8$ cm/s.

3. The hypothesis of the origin of planetary and satellite systems.

The essence of the proposed hypothesis is that the formation of planetary and satellite systems consists of two types of closely related processes: revolutionary and evolutionary. Among the revolutionary are quickly proceeding processes of dividing and capture bodies. To evolutionary processes belong condensation, accretion and gradual changes of the orbits due to gravitational braking, action of disturbing forces. As a result of gradual changes in mass, increasing in size, the gravitational braking, action of disturbing forces the orbital system loses its stability and is coming the stage of revolutionary change.

In other words the heavenly bodies has always existed, and planetary and satellite systems were formed or broken up by recombination (capture mechanism) or a giant disaster-related division or fusion of the central bodies and the transition to other orbits orbital bodies.

The accretion mechanism works between these revolutionary transformations. It is expressed in the gradual change of mass, accumulation of
secular changes of the orbits, which are ultimately expressed in the "aging" of the system, the loss of its stability and transformation mechanisms of capture or dividing. The hypothesis is consistent or explains almost all of the previously listed facts.

Thus, it can be assumed that in the process of emergence and evolution of planetary and satellite systems involved all three known mechanisms: condensation (accretion), dividing and capture. Condensation and accretion occur during gradual evolutionary change systems. Deep qualitative transformation occurs during capture, and especially when the dividing of the bodies. There is a deep analogy with chemical reactions and nuclear transformations.

4. Confirm the proposed hypothesis about the origin of planetary and satellite systems.

Consider how the proposed hypothesis meets the requirements outlined in section 2.

The fact that the orbital planes of the planets are close or coincide with the equatorial plane of the Sun, satisfactorily explains the accretion theory of the origin of the rotating protoplanetary disk. But it found difficulty in explaining satellite system of Uranus. The satellites in this system are treated in the plane with a slope of $\sim 90^0$ to the plane of the equator of the Sun.

According to the proposed hypothesis rotating central body causes the greatest deformation field and therefore the greatest orientation of the force lines in the plane of rotation. In this plane, the satellites move with minimal resistance. Therefore, in the process of evolution they go into orbit lying in the equatorial plane of the system. Uranium, as the central body rotates in a plane located at an angle of ~ 90^0 that specifies the angle of inclination of the orbits of its satellites.

Synchronous rotation of the Sun and planets and their satellites can be associated either with a smaller angle at which an orbiting body crosses the power line in synchronous rotation, which leads to greater stability of the orbit. Or dominant influence becomes gravimagnetic Lorentz force. To address the issue required further analysis taking into account the orientation of the gravitational and gravimagnetic power lines.

The question of a significant deviation of the equatorial planes of the planets from the planes of their orbits cannot be satisfactorily explained within the framework of accretion theories. Condensed substance from a rotating protoplanetary disk (clouds) must rotate in the same plane, According to the proposed hypothesis, the deviation of the rotation plane of the planet from the plane of its orbit of revolution around the Sun due to the initial parameters of the planet at capture it on solar orbit.

The question of what the planet that does not have its own rotational movement around its axis (Mercury) or low speed (Venus), do not have satellites, was first raised in [1]. This fact also does not find an explanation from the positions of the accretion theories. At the same it is a confirmation of the proposed concept of the origin of the Solar system. Only not rotating or rotating at a low speed of the planet does not have an impact on the surrounding gravitational field and therefore can not call it such changes the orientation of the power lines that provide orbiting satellites to move without energy consumption. By the way, Venus, apparently, some time had a natural satellite [2], which ceased to exist due to the high gravitational resistance to its movement.

The dependence of the orbital, i.e. planetary and satellite distances to the central bodies from the parameters of the rotation of the latter cannot be satisfactorily explained in terms of the accretion theories. At the same time put forward the concept of the influence of rotation on the surrounding gravitational field by shear deformation of the force lines and formation areas, with their concentric orientation allows not only to explain the existence of the laws of planetary and satellite distances, but also to clarify this pattern.

It turned out that the distance to the central bodies depend on the parameters of the rotation of the central bodies and are expressed by the equation $R = n^2(GMT/C)^{0.5}$, where R is the distance to a planet or satellite, n is the number of

whole (quantum) numbers. G is the gravitational constant, M and T are the mass and the period of rotation of the central body, C is the speed of propagation of gravitational radiation, equal to (1,64÷7,15)·108 cm/s,

The accretion theory encounters difficulties in explaining the fact that in the central bodies is concentrated the bulk of mass of systems (the Sun 99%), but they accounted for a negligible proportion of the kinetic energy (the Sun 2%). During the formation of the planetary system from the protoplanetary disk it is impossible. The explanation based on the theory of capture does not meet any difficulties.

The formation of rings of planets is a universal phenomenon. The accretion theory gives a satisfactory explanation for this phenomenon. It is shown that the formation of rings depends on the parameters of the rotation of planets, expressed in the form of a complex $(MT)^{0.5}$ and, therefore, fit within the proposed concept of the origin of the Solar system.

In relation to the secular deceleration of the rotation speed of the Sun and planets, there is the explanation that it is due to tidal interaction of cosmic bodies. In accordance with developing a new concept plays a vital role gravitational resistance caused by the viscous resistance to rotation due to the shear deformation of the physical environment (physical vacuum, ether).

Braking artificial satellites out of the atmosphere is not explained by various embodiments of the accretion theory. There are individual variances of explanation by the resistance of the solar wind and light pressure or unaccounted for by the gravitational interaction with the cosmic bodies. Meanwhile, this question is crucial for the theory of capture space bodies.

The main objection against the theory of capture is allegedly the lack of a "consumer" of the energy released when approaching bodies after capture. In Chapter 7 it is shown that when the orbital convergence of cosmic bodies released potential energy at 50% goes to increase the orbital velocity and 50% is allocated (dissipated) in the surrounding space as a emerge of gravitational radiation.

Thus, the user of the second half of the released energy in the form of gravitational radiation is the surrounding physical environment (physical vacuum, ether). This is in contrast to electromagnetic another form of energy, which we do not yet know how to use and even to determine experimentally. Can only with high accuracy to calculate the change in orbital distances.

Conclusions.

1. In the process of emergence and evolution of planetary and satellite systems are three known mechanisms: condensation (accretion), dividing and capture. Condensation, accretion and a slow accumulation in orbits changing's occur during gradual evolutionary change of systems, which are then accompanied by spasmodic (catastrophic) changes in the dividing and capture cosmic bodies.
2. Summarizes the requirements of the modern theory of the origin of the Solar system.

Literature

1. AT Serkov, Space research, 2009, T. 47, No. 4, S. 379.
2. http://www.molas.ru/as/Sputnik_Veneri

Conclusion.

The application of the concept of "power lines" or "force line" in the description of the gravitational field inevitably dictates the introduction of other terms that characterize the field: the modulus of elasticity, the viscosity, the anisotropic structure and the ability to shear deformation. Accordingly expands the understanding of the nature of the gravitational interaction.

To describe the static interaction of two bodies with masses M_1 and M_2, located at a distance R is quite the inverse square law of Newton: $f = GM_1M_2/R^2$. Here f is the interaction force, G is the gravitational constant.

For a moving body, you should consider its interaction with the surrounding physical environment. When the rotating body experiences a viscous resistance, and the surrounding field - shear deformation, which resulting the body by its rotation generates gravitational waves. The distance from the surface of the body to the crests of the waves expresses orbital distance and is determined by the formula: $R = n^2(GMT/C)^{0.5}$, where n is the whole (quantum) numbers, G is the gravitational constant, M and T are the mass and the period of rotation of the central body, C is dynamic gravitational constant having the dimension of velocity. When calculating the parameters of the Sun, Jupiter, Saturn. Uranus and Neptune it has a mean value of $C = 4{,}63.10^8$ cm/s.

When the orbital motion the body feels the drag and the gravitational field is periodic shear deformation, which is distributed in the surrounding space in the form of gravitational radiation. The strength of the gravitational resistance is expressed by the equation similar to the electrodynamics formula Lorentz: $f_{gm} = (v/C)^2 (M_1M_2/R^2)\text{Sin}\acute{\alpha}$, where v is the orbital speed of a body, C is the speed of gravitational radiation. M_1 and M_2 the mass of the central and orbital body, R is the orbital radius, α is the angle at which the orbiting body crosses the power line of gravimagnetic field

Power gravimagnetic resistance f_{gm} in contrast to the Newtonian gravitational force depends on the ratio $(v/C)^2$ and $\text{Sin}\acute{\alpha}$ and so much less. Still there is a debate about its real existence. It has a maximum value when $\text{Sin}\acute{\alpha} = 1$. Such a case occurs when the orbital motion is around a non rotating central body, when it crosses the radial oriented force lines at angle of 90^0.

Using data on braking of several satellites of the Moon was calculated constant C, which was equal $3{,}14.10^8$ cm/s, which is very close to the earlier value of the constant $C = 4{,}63.10^8$ cm/s.

Advanced understanding of gravitational interaction in connection with the introduction of the concept M.Faraday`s hypothesis on the gravitational power lines and consideration of the gravitational field as elastic-viscous body also allows a

new approach to the problems of repulsive forces in space, the formation of ring structures around the planets, the laws of mass distribution and origin of the Solar system.