



Journal of Applied Science and Engineering Research
Issue: Vol. 2; No. 1; March 2021 pp. 6-15
ISSN: 2691-6061 (Print) 2691-607X (Online)
Website: www.jaser-net.com
E-mail: editor@jaser-net.com
Doi: Doi: 10.48150/jaser.v2no1.2021.a2

Paradoxes of the Theory of Gravity

S. Orlov

Petrozavodsk State University

Showing the contradictions in the physics calculations using the equations of the classical theory of gravitation. Alternatively, investigate the physical properties of space objects on the basis of the theory of vortex gravitation, cosmology and cosmogony. The obtained results allow us to evaluate and compare the above objective, physical theories.

Keywords: ether, theory of vortex gravitation

1. Introduction

In the world of science, from the time of Isaac Newton (1664), the attraction of bodies to celestial objects are explained only by the fact that the mass - the amount of matter - attracts other mass. In 1915, Einstein's theory of relativity has perfected the idea. Over the 350 years of its existence, this unproven interaction of gravity and mass of bodies turned into a canonical, the fundamental theory. In addition to this theory, in the academic, modern science does not recognize any alternative scientific concepts.

During its existence, the classical theory of gravitation has generated a lot of controversy. Generally accepted explanation for these discrepancies are not currently exist. In this paper we propose an explanation of the paradoxes of the mutual attraction of bodies on the basis of the vortex theory of gravity. In the second section is a summary of the basic theory of vortex gravitation.

2. Vortex Theory Of Gravity

Vortex theory of gravity [1] is based on well-known astronomical fact - all the heavenly bodies revolve. The most logical explanation of the cause of this movement can be only one - the rotation of celestial objects generated vortex rotation of cosmic matter - ether. Ether forming a global system of interconnected space vortices. The orbital speed of the ether in each vortex (torsion), decreasing from the center to the periphery of the law of the inverse square of the removal. If the orbital velocity decrease of ether, then, according to the laws of aerodynamics, increased pressure in the stream. The pressure gradient generates a force pushing towards the zone with the lowest pressure, i.e. towards the center of the torsion bar. Thus, in the center of the torsion accumulates cosmic matter and creates a celestial body. Body or substances that move in orbits with torsion first cosmic velocity, are constant companions of the space system (torsion). Consider the equation of vortex gravitation theory obtained in [1].

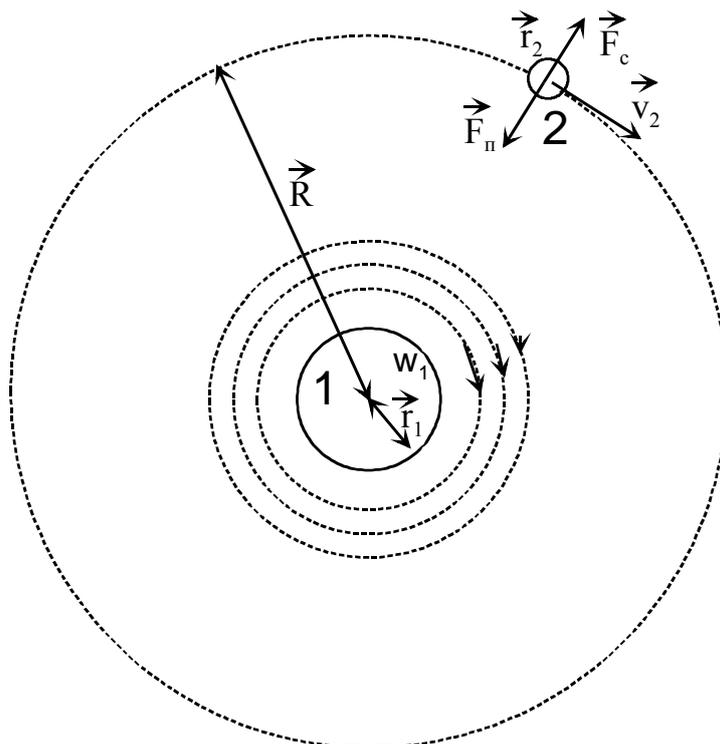


Fig.1. Two-dimensional model of gravitational interaction of two bodies. The forces are shown acting on body 2: F_c – the centrifugal force, F_n – the force of attraction of body 2 from body 1; v_2 – linear velocity of body 2 at the orbit, r – the radius of the orbit, r_1 – the radius of body 1, r_2 – the radius of body 2, w_1 – angular velocity of ether rotation at the surface of body 1, and m_2 are the mass of body 2.

As already mentioned, due to the vortex pressure gradient arises. The radial distribution of pressure and velocity in the ether [1] defined on the basis of the Navier-Stokes equations for the motion of a viscous fluid (gas).

$$\rho \left[\frac{\partial}{\partial t} + \vec{v} \cdot \text{grad} \right] \vec{v} = \vec{F} - \text{grad } P + \eta \Delta \vec{v} \quad (1)$$

in cylindrical coordinates with the radial symmetry $v_r = v_z = 0 = v(r)$, $P = P(r)\phi$, v can be written as an equation system

$$\begin{cases} -\frac{v(r)^2}{r} = -\frac{1}{\rho} \frac{dP}{dr} \\ \eta \cdot \left(\frac{\partial^2 v(r)}{\partial r^2} + \frac{\partial v(r)}{r \partial r} - \frac{v(r)}{r^2} \right) = 0 \end{cases} \quad (2)$$

where $\rho = 8.85 \times 10^{-12} \text{ kg} \cdot \text{m}^{-3}$ - the density of [2] - the velocity vector of the ether, P - pressure of ether, η - toughness.

In cylindrical coordinates for the module gravity \vec{F}_n

$$F_n = V \cdot \frac{\partial P}{\partial r} \quad (3)$$

then comparing (2) and (3) for incompressible ether $\rho = \text{const}$, we find that

$$F_n = V \cdot \rho \cdot \frac{v(r)^2}{r} \quad (4)$$

After the necessary transformations (full account of the theory presented in [1]) is obtained:
 1. equations for the force of gravity, depending on the rotational speed ether

$$F_{\Pi} = \frac{4 \cdot \pi \cdot r_n^3 \cdot \rho \cdot \omega_1^2 \cdot r_1^3 \cdot m_2}{3 \cdot m_n \cdot r^2} \quad (5)$$

r_n, m_n - the radius and the mass of the nucleon.

2. The equations for determining the dependence of the pressure on the body surface P_0 , the speed of rotation of

$$P_0 = P_b - \rho \cdot \omega_1^2 \cdot r_1^2 \quad (6)$$

where P_0 - ether pressure at the surface of the body, using the boundary condition $P(\infty) = P_b$

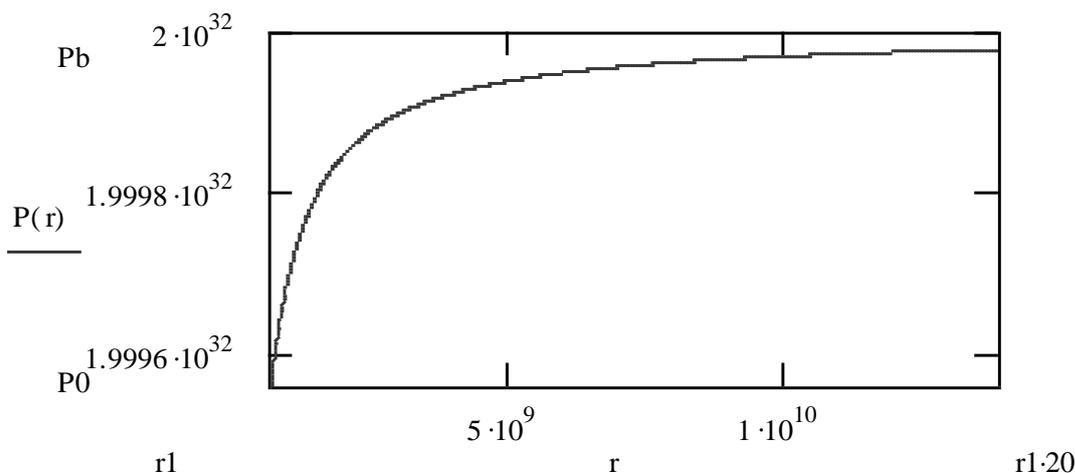


Figure 2. The radial distribution of the ether pressure for the Sun

Equations vortex gravitation (3) and (4) show the force of gravity acting on any body (point) depends on the pressure gradient at the point in ether. The pressure is inversely proportional to the rate of ether considered orbit. The orbital velocity of the ether decreases from the center to the periphery of torsion.

3. Controversy

3.1 Non-compliance of the gravitational interaction of three bodies.

In classical Newtonian mechanics, the force of gravity is determined by the F_n -known equation –

$$F_{\Pi} = G \cdot \frac{m_1 \cdot m_2}{r^2} \quad (7)$$

where m_1, m_2 - mass of bodies 1 and 2, respectively, $G = 6.672 \cdot 10^{-11} \text{ N} \cdot \text{m}^2/\text{kg}^2$ - the gravitational constant, r - the distance between the bodies.

Consider a few contradictions in the theory of gravitation and their explanations in terms of the vortex theory of gravity.

Approx. The units used in SI.

3.1.1 The strength of the gravitational interaction of three celestial bodies on the basis of the theory of universal gravitation (Equation 7) –

Determine the force effect of gravity on the moon:

- Earth's gravity - $F_{em} = 2,6 \times 10^{-3} \times m_m$

- Solar gravity - $F_{sm} = 6,0 \times 10^{-3} \times m_m$

The strength of the solar gravity is 2.3 times more than the Earth's. Therefore, the moon can not be a satellite of the Earth.

Determine the force of gravity on the actions of the Oort cloud:

- Solar gravity – $F_{sg} = 5,6 \times 10^{-13} \times m_0$
- Galactic gravity - $F_{go} = 2,3 \times 10^{-10} \times m_0$

The strength of the galactic gravity 410 times more solar. Consequently, the Oort cloud can not be a satellite solar system.

3.1.2 The gravitational interaction of three celestial bodies on the basis of the vortex theory of gravity. Fig. 2.

According to equation (3) determines the strength of the vortex gravitation pressure gradient in the etheric vortex (torsion). The pressure gradient and the absolute value of a torsion bar is always directly proportional to the orbital velocity of circulation of ether, in accordance with the formulas 4 and 5.

Ether - over a low-density gas environment, consisting of very small particles - it. So he (ether) freely permeates any substance, other than nucleons. Consequently, the eddy currents crossing the torsion bars - Earth, the Sun and the Galaxy pass freely through each other. The pressure in the crossing areas depends orbital streams having the lowest speed. This is due to the fact that any counterclaim and a faster flow can not change (increase) the speed of the slower flow of another torsion. Hence, this is less high velocity determines the amount and pressure gradient. That is, we have the addition of velocities $V_e + V_s = V_e$. Where V_e - orbital velocity of air flow of the Earth torsion, V_s - orbital velocity air stream sun torsion.

We make a payment reduction of the absolute value of the pressure at the intersection of torsion on the basis of the equations of the theory of gravity vortex.

In the theory of vortex gravitation [1] the linear velocity of the orbital sun torsion ether flows on the surface of the Sun - $V_s = 7,1 \times 10^{19} \text{ m / c}$.

In accordance with the formula $v(r) \sim \frac{1}{\sqrt{r}}$ [1] on the Earth's orbit of the moon or sun vortex decreases its speed to a value $V_{se} = 4,5 \times 10^{18} \text{ m/c}$. Absolute pressure value in accordance with equation (6) is reduced by

$$- \rho \times V^2 = - \rho \times 2,0 \times 10^{37}$$

Linear velocity of air flow on the surface of the Earth $V_e = 1,3 \times 10^{18} \text{ m / c}$. In lunar orbit the Earth torsion live stream has a velocity $V_{em} = 1,6 \times 10^{17} \text{ m/c}$. Pressure is reduced by

$$- \rho \times V^2 = - \rho \times 2,6 \times 10^{34}.$$

Consequently, the pressure in the vortex of the Earth torsion on the Moon's orbit for three orders of magnitude higher than the pressure in the orbital stream sun torsion in the same space point. Therefore the bodies orbiting the Earth, the location of the orbits are determined by the pressure gradient only in the Earth torsion.

The dominance of the Earth torsion to determine the pressure is up to that orbit the torsion to which it can hold air in the thread.

Consider the interaction of gravitation and pressure values at the farthest satellite solar systems Oort cloud.

According to the theory of gravity vortex velocity of the ether sun torsion in orbit Oort.

$V_{so} = 1,4 \times 10^{16} \text{ m/c}$. Reducing the pressure on - $\rho \times V^2 = - \rho \times 2,0 \times 10^{32}$.

Ether velocity galactic torsion in orbit of the Sun (the Oort cloud)

$V_{so} = 1,2 \times 10^{20} \text{ m/c}$. Reducing the pressure on - $\rho \times V^2 = - \rho \times 1,4 \times 10^{40}$.

. The pressure in the sun torsion eight orders of magnitude higher than in the galactic. Consequently, the position of the orbit of the Oort cloud completely determines the pressure gradient in the sun torsion.

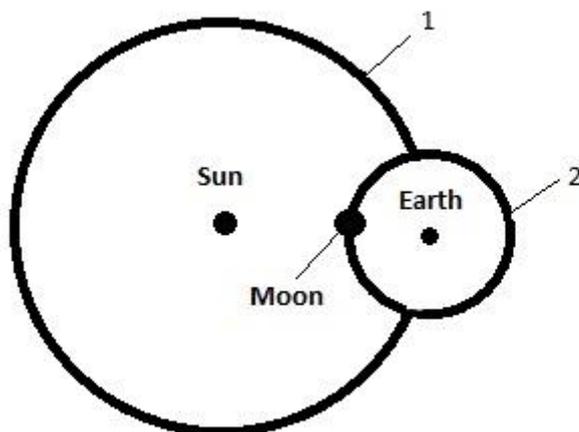


Fig. 3 Scheme ethereal, space and gravitational torsion bars. 1 - Earth's orbit of the sun torsion ether, 2 - lunar orbit in the earth's ether torsion.

3.2 Paradox Neumann – Seliger

Named for the German scientists K. Neumann and H. Seliger 19-th c. Has a less obvious character and the fact that Newton's law of gravity does not give a reasonable answer to the question of the gravitational field created by an infinite system of celestial bodies.

According to Section 1.2 of this article, the paradox is explained by the fact that the gravitational torsion bars do not interact with each other and, consequently, the strength of the vortex gravitation can not be combined. Consequently, the strength of the vortex gravity can not be infinitely large. That is, an infinite number of celestial bodies must create a common, infinite force of gravity that would fill the entire universe. In this case, the existence of celestial bodies would be impossible.

In addition, two more paradoxes should be noted in the Newton equation (7):

1. As the distance between the bodies decreases to a minimum value, the gravitational force should tend to infinity. Obviously, we do not observe such an attraction force.
2. This equation can not determine the force of gravity inside the celestial body.

3.3 The masses of celestial bodies

Determine the weight of the celestial bodies can be known only by values of the forces of gravity, in accordance with equation (7). The method of selection of these masses were "determined". According to the "known" to the masses and volumes were calculated average densities of the planets and stars.

Below are the values of density (ρ) the force of gravity on the surface (F_g) and radius (r) of the Earth, the Sun and Saturn.

Earth [3] - $\rho = 5515 \text{ kg/m}^3$, $F_g = 9,8 \text{ m}$, $r = 6,37 \times 10^6 \text{ m}$,

Sun [4] - $\rho = 1409 \text{ kg/m}^3$, $F_g = 274,0 \text{ m}$, $r = 6,96 \times 10^8 \text{ m}$,

Saturn [5] - $\rho = 687 \text{ kg/m}^3$, $F_g = 10,4 \text{ m}$, $r = 6,03 \times 10^7 \text{ m}$

This comparison is obvious physical disparity - the Earth's gravitational field is the smallest, and the density of the Earth - the largest. This is contrary to the laws of physics as well as the density of a substance is directly proportional to the compression force (gravity) acting on it and inversely proportional to the resistance of the structural links that connect the elements of the substance. In addition, the above comparison of gravitational forces cannot be an objective, as their operation is shown at different distances from the center

of the body. For an objective assessment of the forces of gravity to determine the magnitude of the force at the same distances (r) from the center. That is inside them.

The classical theory of gravitation can not determine the gravitational forces acting within the body. In the theory of vortex gravitation and cosmology [1], the solution of this problem is not difficult. According to this theory, gravity and celestial bodies create ethereal, cosmic vortexes (torsion bars). Ether has such a low density of matter, which is free to penetrate any body. Therefore, in each celestial body torsion bar continues its rotation, increasing its orbital speed, according to the law of inverse square of the distance to the center of rotation. On the basis of this relationship ($F \sim 1/r^2$) can determine the force of gravity in any celestial object.

We define the gravity of the objects at the same distance (the radius of the Earth) $r = 6,37 \times 10^6$ from the center of the body (torsion).

Earth $F_{ge} = 9,8 \text{ m}$,

Sun $F_{gsun} = 3,3 \times 10^6 \text{ m}$,

Saturn $F_{gsat} = 846 \text{ m}$

Comparing the magnitude of the forces of gravity, it can be argued that the density of the substance of Saturn, and the more of the sun, should be significantly higher than the density of the Earth.

Therefore, the generally accepted value of the mass of celestial bodies are very far from the actual values.

In the space, there are objects in which gravity is so large that they hold any body, including light. These objects are called the Black Hole. In 1915, Karl Schwarzschild [6] on the basis of exact solutions of Einstein's equations to determine the radius of the Black Hole as follows –

$$r_s = \frac{2GM}{c^2}, \quad (8)$$

Where r_s - radius of the Black Hole, M - mass of the black hole, with the speed of light, $G = 6.672 \cdot 10^{-11} \text{ N} \cdot \text{m}^2/\text{kg}^2$ - the gravitational constant.

From equation (8) we obtain the equation for determining the mass of the Black Hole –

$$M = r_s c^2 / 2G, \quad (9)$$

Equations (8) and (9) has a physical mismatch. It its members - C and G - constant, and the mass of the body is directly proportional to the radius only. But the mass as the volume of the body, can only be directly proportional to the cube of the radius of the body, since every body has a three-dimensional measurement, and the radius - linear.

Due to this inconsistency in the use of equations (8) and (9) obtained absurd results :

- A black hole with tons of earth, according to (9) will have a radius $R = 9 \text{ mm}$. This means that the density of the black hole will be measured in the order of 10^{30} kg/m^3 . This density is much larger than the density of an atomic nucleus. But if we calculate the density of the Black Hole of our galaxy with a radius $R_s = 6,75 \times 10^{12} \text{ m}$, defined in [7], it will be in the order of 5 kg/m^3 ! But this density corresponds to the density of the gas. Suppose that there is a black hole with a radius of $R_{bh} = 10^{20} \text{ m}$. It should have a density of matter in the order of 10^{-14} kg/m^3 ? But such a density less than the density of ether

From these calculations, we can conclude - Schwarzschild equation (8) and the **classical equations of universal gravitation does not correspond to physical laws.**

3.4 "The collapse of the" bodies

After the approval of Newton's law of gravity, it was found that some of the bodies under its own gravity to shrink uncontrollably and "collapsing" - virtually disappear from their surroundings. Vortex theory of gravity based on the fact that ether can not penetrate the nucleons or material with a density of nucleons. Consequently, under the influence of great strength of the vortex gravitation, in the center of the torsion forms the core with the same enormous density. For the ether surface of this core is the inner boundary of proper rotation. That is, the speed of rotation of ether and force of gravity on the surface of the vortex core is the

maximum attainable for this torsion. Thus, the problem of "collapse" of bodies in the vortex theory of gravity does not exist.

3.5 Dark Matter

The first indication of the fact that with the estimated mass of the universe is something wrong, there was in the mid 30-ies of XX century. Swiss astronomer Fritz Zwicky measured the speed with which the Coma galaxy cluster (which is one of the largest known concentrations of us, it contains thousands of galaxies) are moving around a common center. The result was discouraging: the velocity of galaxies were much larger than could be expected from the observed total mass of the cluster. This meant that the actual mass of the Coma cluster is much more visible. But the bulk of the material present in this region of the universe, is for some reason invisible and in accessible to direct observation, showing itself only gravitationally, that is just as mass. This mass is called dark matter.

In the theory of vortex gravitation attraction is not due weight, and speed of the ether. Therefore, the presence of additional mass - dark matter to explain the force of gravity in any region of the universe is not required. This requires corresponding figure out speed, ether torsion in this area.

3.6 The ebb and flow.

As is well known appearance in the seas tides in 24 hours and 50 minutes due to the influence of the gravitational field of the moon. But the earth's surface is drawn relative to the Moon only once during that time and tides happen twice. In order to eliminate this trouble scientific world (Galileo, Descartes, Newton, and others) came up with the hypothesis that the second time the tides are caused by the centrifugal force. So far, the science-based calculation of occurrence and the effect of centrifugal force does not exist.

The second trouble is that the lunar gravity acting on the earth's surface is 200 times fainter than the sun. Therefore it is necessary to declare that the sun - the main culprit of the tides. But the earth's surface turns to the sun for 24 hours, and the tides occur twice in 24 hours and 50 minutes. It is clear that the classical explanation of the tides is very controversial, but still, it is - and the only universally accepted. The model of vortex gravitation allows you to put forward new explanation for this phenomenon, which is as follows.

On the basis of the vortex gravitation, the shape of the earth, air, gravitation torsion - a disc-shaped, flat-symmetric [1]. The orientation of the Earth torsion largely coincides with the plane of the lunar orbit. The equatorial plane of the Earth has an inclination to the plane of the Earth torsion about 24 degrees. The geometrical relation of these moods is evident that each point of the surface of the Earth is drawn in the plane, which has a significant inclination with respect to the plane of the Earth's gravitational torsion. Thus, one and the same point of the equatorial surface of the earth gravitational constant torsion transversely intersects its direction. In this case, accordingly, the strength of the vortex Earth's gravity acting on that point (see Fig. 3).

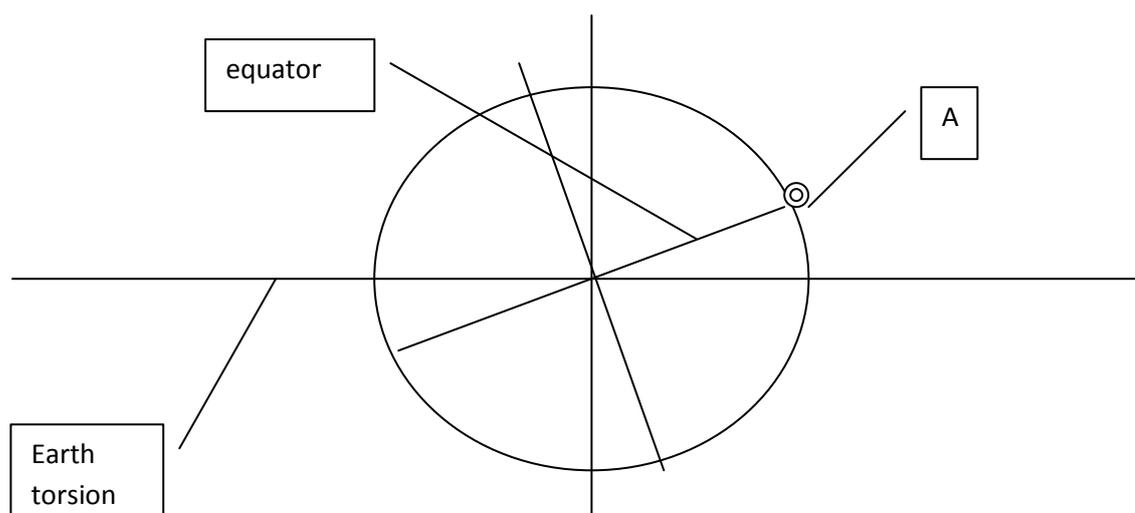


Fig. 4 Inclination of the Earth's equator

The point A is located on the equator, with its daily motion around the center of the Earth to double-cross the central plane of the Earth torsion and twice removed from it. Consequently, the forces of the Earth's gravity twice a day and reach a maximum two times the minimum impact on the point A, which causes the tides. This explains the fact that the tides occur at the same point twice in one day. At the time of the passage of the Earth's gravity that A plane gravitational force acts on this point with the maximum value, which "crushes" the water surface and low tide occur. After crossing the plane of the Earth that P torsion force of gravity decreases and there is rush of water.

3.7 Elliptical orbits.

As you know, all the planets revolve around the Sun is not a circle but an ellipse. According to the laws of dynamics, inertial movement of the body around the center, in a centrally symmetric gravitational field can only occur in a circle. The reason for non-compliance of planetary motion law of dynamics is explained by the laws of vortex gravitation and cosmology - gravitational pulls torsion bar, not the body. That is the solar gravitational field is symmetric relative to the plane and the center of gravity (the Sun). The forces of attraction decrease in inverse proportion to the square of distance from the sun only in the sun torsion. At a distance from this gravitational plane gravity decreases like the inverse cube of the removal. The calculation of the direction and magnitude of the gravitational forces of the above specified in [1]. In general, the strength of the vortex gravitation force at any point of space, defined by the formula

$$\mathbf{Fgv} = \mathbf{Fgn} \cos^3 \alpha, \quad (10) \quad \text{where}$$

Fgn - the power of gravity in two-dimensional model (Form 5 or Newton's equation)

Fgv - the force of gravity in a three-dimensional vortex model.

α - angle of deflection of the line connecting the center of torsion and of the point to the plane of the gravitational torsion.

$\cos \alpha = \mathbf{b/a}$, where

a - the length of semi-major axis of the ellipse of the orbit of the planet,

b - the length of semi-minor axis of the ellipse of the orbit of the planet.

Based on the above of the forces of gravity of the planet in its treatment twice crossed the plane of the solar gravitation torsion. At this point, the planets, the influence of solar gravity, which leads to increase the

curvature of the trajectory of the planets treatment. At a distance from the plane of gravity, the force of attraction and the weakening of the orbit of the planets "straighten". Consequently, in its orbital motion of the planet in the most deviate from the solar gravitational plane at the vertices of semi-minor axis of its orbit.

In the theory of vortex gravitation [1] calculated the force of solar gravity acting on the planets Mercury and Pluto, in the tops of small semi-axes of the orbits. The calculation is performed in accordance with Newtonian physics equation (7) and equation theory vortex gravity (10). According to the laws of dynamics of the gravitational forces acting on the planet, should be equal to the centrifugal forces. To assess the accuracy of the calculations, the values were compared with the values of the forces of gravity centrifugal forces in these astronomical points. The coordinates of the planets taken by [8].

Mercury

The centrifugal force $F_c = 36,503 M_m$, where M_m - the mass of Mercury, $v/a = \cos \alpha = 0,9786$.

The sun gravitation:

According to Newton $F_{gn} = 39,09 M_m$, (deviation from the centrifugal forces +7.1%)

According to the theory of gravity vortex $F_{gv} = 39,09 \times 0,9372 = 36,63 M_m$ (divergence + 0.35%)

Pluto

The centrifugal force $F_c = 0,00344 M_p$, where M_p - mass of Pluto, $v/a = \cos \alpha = 0,9685$,

The power of solar gravity:

According to Newton $F_{gn} = 0,00382 M_p$ (divergence from the centrifugal forces + 11.1%)

According to the theory of gravity vortex $F_{gv} = 0,00382 \times 0,9084 = 0,00347 M_p$ (divergence + 0.87%).

Note. Equation (10) shows - if the space body would be deviated from the plane of the sun, the gravitational torsion of 60 degrees, the solar gravity acted on the body with the force of gravity on the value of 0.125 calculated from the classical theory of gravitation.

Obviously, classical equation gravitation can be used only in one plane - in the plane of gravitational torsion.

3.8 Symmetry of gravity forces

In the theories of Newton-Einstein the gravitational forces decrease from a body with the same magnitude in all directions.

In this case, the existence of celestial bodies would be impossible. The planes of the orbits of celestial bodies would have any directions. So the orbital radii of all celestial bodies change, then there must be intersections of these orbits, collision and death of celestial bodies.

Only vortex gravity gives the necessary order in astrodynamics. The systems of all celestial bodies (planetary, galaxy) rotate in one plane and in one direction, and not spherically, as it should be according to the classical theory of gravitation.

3.9 Interatomic attraction

Strength of any substance is created by interatomic forces of attraction. In modern science, these forces are called electrostatic or quantum mechanical. The following types of bond in solids are distinguished by the nature of the interatomic forces: ionic, covalent, metallic, hydrogen, the Van der Waals bond [9]. The forces of gravitation between atoms, according to classical theories, do not exist. Why? Because the Newton-Einstein equations will give an absurd result and scientists replaced the forces of interatomic gravity with other quantities.

In the theory of vortex gravity, atoms are created by ether micro vortices. These micro vortices not only create atoms, but also the forces of atomic gravity, which can be determined in accordance with equation (5).

4. Conclusion

The above contradictions of the classical theories of gravity world are only some of the many physical challenges faced by these theories. The presence of gravitational properties of objects or substances, and no one has ever been proven. Based on this we can conclude that the theories of Newton and Einstein are mathematical or empirical gravity model, which deflect the development of science in the wrong direction.

Vortex theory of gravity does not contain any contradictions for physical settlement of any properties cosmic substance. This proves the objectivity of its principles for further scientific research.

REFERENCES

- [1] S. Orlov. *Foundation of vortex gravitation, cosmology and cosmogony*. Global journal of science Frontier research. Physic and Space Science Volume 12 issue 1 Version 1.0 January 2012
http://www.google.ru/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCoQFjAA&url=http%3A%2F%2Fjournalofscience.org%2Findex.php%2FGJSFR%2Farticle%2Fdownload%2F361%2F325&ei=knHzUae5O8Tj4QTn6IGgBQ&usg=AFQjCNEkl5FS3ElmxLZZZxE_IDQZqVMI6Q&bvm=bv.49784469,d.bGE&cad=rjt
- [2] V A Atsurovskiy. *General ether-dynamics*. Energoatomizdat. Moscow, Russia. 1990. Page 278.
- [3] *US Space Command Reentry Assessment - US Space Command Fact Sheet*. SpaceRef Interactive (March 1, 2001)
- [4] <http://solarsystem.nasa.gov/planets/profile.cfm?Object=Sun&Display=Facts&System=Metric>. *Solar System Exploration*. NASA.
- [5] *Yeomans, Donald K. HORIZONS System*. NASA JPL (13 июля 2006).
- [6] *K. Schwarzschild Über das Gravitationsfeld eines Massenpunktes nach der Einsteinschen Theorie Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften 1. — 1916. — 189—196.*
- [7] *Downes, D.; Martin, A. H. M. Compact Radio Sources in the Galactic Nucleus // Nature. — 1971. — Vol. 233. — C. 112—114.*
- [8] A P Gulyaev. *Astronomy calendar*. Cosmosinform. Moscow, Russia. 1993. Page 285.
- [9] ↑ S.V. Ordin, [B.N. Sharupin and M. I. Fedorov], *J. Semiconductors (FTP)*, 32(9), 924—932, 1998, Normal lattice vibrations and the crystal structure of anisotropic modifications of boron nitride