

There is no Reason to Doubt the Newton's Law of Gravitation

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I always read with great interest the papers by Charles William Lucas. He does not agree with contemporary scientific view of the world, sees many shortcomings in it, and is trying to eliminate them, offering his way to overcome them.

Outside the Mainstream there are many researchers who, like Lucas, Jr., do not recognize the fantastic modern constructions in physics. Along the way, I note that because of the lack of publication in the Mainstream, they are not exchanging experiences and results among themselves. Therefore, each of them starts from zero, but does not rise, like of Newton, on the shoulders of others. As a result, the discovered by dissidents of scientific truth do not gain enough strength to overcome the fantasies of Mainstream.

Among all the dissidents Lucas is one most focused on the non-relativistic description of interacting bodies. I followed with interest his work on the interaction of moving charges. I agree with many critical views of Lucas. However, I consider that moving relative to each other the charges q_1 and q_2 interact in another way, namely, the force which is derived in my papers, in particular in [1] - [2] is:

$$\vec{F}_{12} = k \frac{\vec{R}_{12} (1 - \beta^2)}{\left\{ R_{12}^2 - [\vec{\beta} \times \vec{R}_{12}]^2 \right\}^{3/2}}, \quad (1)$$

where $k = k_e = q_1 \cdot q_2 / \varepsilon$ and ε is dielectric permittivity of the medium; $\vec{\beta} = \vec{v}_{12} / c_1$; $c_1 = c / \sqrt{\mu \cdot \varepsilon}$; μ is magnetic permeability of the medium; c_1 – propagation speed of electromagnetic action in it, and \vec{v}_{12} is the velocity vector of the second particle relatively the first one.

In his paper: “Confirmation of New Solar System Force Supports Universal Electrodynamical Force” [Foundations of Science. – 2010, Vol. 13, No. 4], Lucas proposes to add had his electrodynamic force to the Newton's gravity force. To do this, it shows that Newton's law of gravity does not describe the interaction of the Solar system bodies. I disagree with his proposal.

The problem of interaction of Solar system bodies (the Sun, planets and the Moon) by Newton's law, we have solved for 100 million years (see, for example, [3]). We have compared the results of the solution at small time intervals with observations and have found that they coincide. Only one element of the orbit and only for one body, namely the position of the perihelion of Mercury is slightly different from that calculated by Newton's law of gravitation. We have found an explanation for this. It turned out that due to rotation of the Sun about its axis the additional Newtonian effect rise, which shifts the perihelion of Mercury. We divided the part of the Sun's mass, between bodies in the plane of its equator. Such system, together with other bodies of the Solar system has given the observed rotation of Mercury's perihelion [4] and not changed the dynamics of the other elements of the orbits.

When comparing the results of calculations with observations, we also made sure that the values of orbital elements in the first approximation coincide with the results of the problem of interaction between two bodies (the Sun and planet or the planet and satellite) at Newton's law of gravitation, in particular the two equations of this problem: the law of conservation of angular momentum (Kepler's second law)

$$r v = \text{const} = R_p \cdot v_p = R_a v_a \quad (2)$$

and the orbital period P

$$P^2 = 4\pi^2 \cdot a^3 / G \cdot (M + m), \quad (3)$$

where the indices « p » and « a » are, accordingly, pericenter and apocenter; a is semimajor axis of the orbit.

When the orbit is a circle with a radius $R = R_p = R_a = a$, then the body moves in an orbit with constant velocity v and the orbital period will

$$P = 2\pi R/v. \quad (4)$$

After substituting P in (3) we receive,

$$v^2 \cdot R = G \cdot (M + m). \quad (5)$$

We have derived the product $v^2 \cdot R$, since C.W. Lucas, Jr. uses it to prove the force proposed by Pari Spolter [5].

Now consider the results of the Lucas, by which he proves the error of the Newton's law of gravitation. Table 1 shows that the law (2) is not satisfied, because the ratio $(v_p \cdot R_p + v_a \cdot R_a)/(2v \cdot R) \neq 1$, where the velocity v it is defined by (4) for a circular orbit of radius $R = (R_p + R_a)/2$. The Kepler's second law (2) refers to the distance and velocity for a single orbit (i.e. the radiuses r , R , R_p and R_a in (2) and the velocities on this radiuses must be on the same orbit), but not for two different orbits. Therefore, the output of table 1 is incorrect because the ratio $(v_p \cdot R_p + v_a \cdot R_a)/(v \cdot R)$ is not a consequence of Kepler's second law.

In the tables 2 ÷ 9 for different pairs of bodies, Lucas shows that the product $v^2 \cdot R$ is little changed for the same central body. Since the orbital velocities v , he computes on the formula (4), and the expression $v^2 \cdot R$ in accordance with the Newton's law of gravitation is defined by (5). Since the mass M of the central body is much higher than mass m of its satellite, the product $v^2 \cdot R$ is practically independent of the mass of the satellite. Therefore the formula (5) gives the result presented in Tables 2 ÷ 9, that is, it defines all of the results of these tables.

Thus, the Tables 2 ÷ 9 convincingly demonstrate the validity of Newton's law of gravitation. And the conclusion Lucas that the constancy of the product $v^2 \cdot R \approx \text{const}$ indicates the presence of an additional force that is proportional to $v^2 \cdot R$, is erroneous.

For three centuries, many scholars have suggested amendments to Newton's law of gravitation. However, they were all rejected by the more accurate calculations of the interaction of bodies under the Newton's law of gravitation. Given the above we can say: there is no reason to doubt the Newton's law of gravitation.

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