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Review

The law of universal attraction with momentum exchange between objects and microparticles

Zifeng Li

Petroleum Engineering Institute, Yanshan University, Qinhuangdao 066004, China.

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The law of universal attraction has been used widely. However, how two objects attract each other is still a riddle. Hypotheses, such as gravitons, universal repulsion, sub-photon seas, etc., all have flaws, and do not deal with the basic reason why there is such a law. In this paper, suppose: (1) microparticles at a certain speed, moving like thermal motion of molecules, are distributed in space; (2) the objects are not continuous in microstructure, but there are gaps between the particles comprising the objects, allowing some microparticles to pass through; (3) momentum transferred from microparticles to the objects is proportional to mass of the objects. This theory of momentum exchange between objects and microparticles may interpret the source of universal attraction more reasonably as well as providing a formula to be used as a basis for calculation. Universal attraction is an equivalent expression for momentum exchange between objects and microparticles. This generates the force acting along the line of centers of the two objects which are close to each other. The universal attraction constant *G* is accurate only for astronomical bodies near the earth. Universal attraction between two objects is related to an intermediary between them. There is no graviton.

Key words: Universal attraction, graviton, universal repulsion, photon, microparticle, momentum.

INTRODUCTION

Since Isaac Newton proposed the law of universal attraction (Cheng and Zhang, 1978) in *Mathematical Principles of Natural Philosophy* in 1687, it has been verified by precise experiments, widely applied, and deemed to be one of the most basic physical laws. This law calculates the universal attraction force between two objects. Since then, people have been exploring the mechanism how two objects attract each other (Kochiras, 2009; Minter et al., 2010; Rouvray, 2003; Vickers, 2009; Zee, 2004). However, the hypotheses of gravitons, universal repulsion, and sub-photon sea (Zhang, 2010) etc which have been proposed, all have flaws. They do not deal successfully with the reason for Newton's law. This paper focuses on evaluating these hypotheses, and then tries to explain universal attraction by way of a momentum exchange between objects and microparticles.

LAW OF UNIVERSAL ATTRACTION

Any two objects attract each other by the force along the center line between them. The universal attraction is proportional to their masses multiplied together, and inversely proportional to the square of their distance apart. It is also independent of the chemical nature or physical state of the two objects (Cheng and Zhang, 1978)

$$F = G\frac{m_1 m_2}{r^2} \qquad (1)$$

where, F is universal attraction, m_1 is the mass of object 1, m_2 is the mass of object 2, r is the distance between the two objects, G is the universal attraction constant.

The law of universal attraction, which is that objects attract each other because of their masses, may be used

E-mail: zfli@ysu.edu.cn

to calculate the universal attraction force between two objects. However, in using this law to explain certain astronomical phenomena, some large discrepancies have been noted.

Some literature has dealt with the concept that universal attraction is unrelated to any intermediary between the two objects.

HYPOTHESIS OF GRAVITON

The graviton is a hypothetical particle which is supposed to be responsible for universal attraction. In order to facilitate universal attraction, gravitons must always attract each other, and the range of action is infinitely far with innumerable patterns. In quantum mechanics, a graviton is defined as a boson whose spin is 2 and mass is zero.

At present, the existence of gravitons is a hot topic in the physics world. Many scholars have tried to detect the reality of its existence (Minter et al., 2010) by instruments, but since no positive results have been forthcoming, its existence is still a mystery. By definition, gravitons must always attract each other. However, in general, the effective range between objects is related to their distance from each other: the further apart the objects, the weaker the interaction. Is the attractive range between gravitons infinitely far? Are gravitons capable of an infinite number of patterns? All other matter appears in a limited number of forms in accordance with its own nature. In quantum mechanics, the graviton is defined as boson whose mass is zero. Any matter has mass. If the graviton has no mass, then it is not matter. The world is composed of matter. Gravitons are not matter, so the graviton does not exist.

There is also a view that universal attraction exists between two objects because they emit and receive gravitons from each other. If a graviton exists, it must have mass. If two objects project and receive gravitons from each other, the speed between gravitons and objects will change. According to the momentum theorem, if two objects project and receive gravitons from each other, a repulsive force should exist between the two objects, rather than universal attraction. Therefore, philosophically and logically speaking, the graviton does not exist.

HYPOTHESIS OF UNIVERSAL REPULSION

In July 28, 1979, Daze Peng in Sichuan province proposed universal repulsion concept: "*universal attraction does not exist at all in nature; universal attraction is a wrong scientific concept. There is only universal repulsion in nature; universal repulsion is the basic interactional force which controls the movement of celestial body. Exclusion and being excluded are the only form of movement of objects. Exclusion and movement may affect each other. All the natural movements due to universal attraction must be interpreted correctly by universal repulsion, such as, the apple falls from the tree, the celestial bodies travel in space, starlight offset, tides and ebb, all of which are the results of the universal repulsion." "What Sir Isaac Newton's brilliant inverse square law calculation is not the active universal attraction between two objects, but the thrust on the line connecting their centers of mass under the repulsion in the universe! Formula is numerically correct, but the interpretation of essence of the mechanics is wrong*."

Daze Peng's exploration is consistent with the basic law of materialist philosophy. He only pointed out the probability of existence of universal repulsion, but did not give the source of universal repulsion. Daze Peng's complete papers on repulsion hypothesis are not available; his academic point of view is only available on the internet.

Mr. Daze Peng's hypothesis regarding universal repulsion differs from that of mainstream physics. In the mainstream physics, hypothesis of the particles of repulsion is to explain the repulsive force between the objects, and the corresponding particles are gravitons in order to explain the attraction between objects (He, 1987). Mr. Daze Peng's universal repulsion was introduced as a way to explain the attraction between objects.

HYPOTHESIS OF SUB-PHOTON SEA

Mr. Chong'an Zhang, inspired by the Magdeburg hemispheres experiment, thinks that the space is full of sub-photons (including photons and particles smaller than the photon), and is a sub-photon sea. Pressure is ubiquitous in the sub-photon sea. Sub-photon pressure makes two objects attract to each other (Zhang, 2010).

Magdeburg hemispheres experiment is a scientific experiment that was carried out in 1654 in order to prove the existence of a vacuum. It was carried out by Otto von Home Creek who was the Mayor of Magdeburg in Regensburg of the Roman Empire. He and his assistant made two brass hemispherical shells; put a rubber band in the middle of the shells; then filled the two hemispheres with water and put them together. Then all the water was extracted to form vacuum inside the ball. When all the water was fully extracted, the surrounding atmosphere pressed the two hemispheres together tightly. The atmospheric pressure was such that it required 4 coachmen and 16 horses to pull apart the two halves. Magdeburg hemispheres experiment proved that atmospheric pressure is very powerful. In the experiment, the air inside the two hemispheres was removed to reduce the number of air particles in the ball. The atmosphere outside the two hemispheres pressed them together tightly, so they were not easy to separate.

The hypothesis of the sub-photon sea thus has some justification. However, if we follow the reasoning according to the hemisphere experiment, universal attraction should be proportional to the cross-sectional area of the objects, while universal attraction is directly proportional to the mass of objects in the law of universal attraction.

THEORY OF MOMENTUM EXCHANGE BETWEEN OBJECTS AND MICROPARTICLES

Since the above hypotheses do not explain the source of universal attraction satisfactorily, we will now make the following assumptions: (1) microparticles with a certain speed, moving in the same way as the Brownian motion of molecules, are distributed in space; (2) the objects are not continuous in the microstructure, and there are gaps within the particles making up the objects, which allow some microparticles to pass through; (3) momentum transferred from microparticles to the objects is proportional to mass of the objects.

First, assume that particles moving at a certain speed, in the same way as molecular thermal motion, are distributed in space. Modern physics proves that the physical space around us is filled with a variety of particles which move at various speeds, at times. These microparticles interact with other microparticles or objects. The type, size, speed and direction of these particles are different in different places of the universe. If the sum of momentum of every type particles were zero at some point in space, then the object placed at that point would not be subject to external forces, and would maintain its original state of motion. However, if the sum of momentum of every type were not zero at some point in space, then the object placed at that point would be subject to external forces.

Secondly, assume that the objects are not solid in their microstructure, but have gaps between the particles composing the object, allowing some microparticles to pass through. When microparticles pass through, they may collide with, be absorbed by and produce other effects on the particles making up the object. Alternatively, they could also pass through from the gaps.

Thirdly, the momentum that the microparticles transfer to the object is in proportion to the mass of the object. Because the microparticles are in large quantities and many types, and have a strong penetrability, when they enter the object space, the impact strength should be proportional to the mass of the objects, rather than the cross-sectional area of the objects.

As Figure 1 shows, the masses of two objects are respectively m_1 and m_2 , and the distance between the two objects is r . They are in a large space environment in which the sum of momentum of every type of particle is zero. It is then automatically balanced at the two other directions vertical to the connection, since there is no interference from other objects. For this reason, the only acting force is in the direction connecting the two objects.

Assume that the distribution of original momentum of the microparticles is p_0 , so that p_0 acts on the outside of the two objects, namely, on the left of m_1 and on the right of m_2 . On the right side of m_1 , the momentum field of microparticles is p_1 ; p_1 is from p_0 on the right of m_2 , after traveling the distance of r from m_2 to m_1 and due to the effect of m_2 . On the left side of m_2 , the momentum field of particles is p_2 ; p_2 is from p_0 on the left of m_1 , after traveling the distance of r from m_1 to m_2 and due to the effect of m_1 .

According to the third hypothesis, the force acting on m_1 is given by:

$$F_1 = k_1 m_1 (p_0 - p_1) \tag{2}$$

where, k_1 is the momentum absorption coefficient of m_1 due to the microparticles. p_1 , on the right of m_1 , is the rest of p_0 after absorption by m_2

$$p_1 = p_0\left(1 - k_2 \frac{m_2}{Ar^2}\right) \qquad \left(k_2 \frac{m_2}{Ar^2} \le 1\right) \tag{3}$$

where, k_2 is the momentum absorption coefficient of m_2 due to the microparticles. The denominator Ar^2 comes from a consideration of the change of momentum density of microparticles. When the spread angle is fixed, A is the impact coefficient of the spread angle.

If we now substitute (3) into (2)

$$F_1 = k_1 k_2 p_0 \frac{m_1 m_2}{Ar^2} \tag{4}$$

When $k_2 \frac{m_2}{Ar^2} = 1$, then p_0 on the right of m_2 is completely absorbed by m_2 . While passing through m_2 , the particles' momentum field p_1 on the right of m_1 is zero. At this point, $F_1 = k_1 m_1 p_0$, from which we obtain the maximum value. Similarly, we can obtain the force acting on m_2

$$F_2 = k_1 k_2 p_0 \frac{m_1 m_2}{Ar^2} \tag{5}$$

So it is clear that $F_1 = F_2$. Numerically speaking, mutual attraction is equal for two objects, thus it is right to use a code

$$F = k_1 k_2 p_0 \frac{m_1 m_2}{Ar^2} \tag{6}$$

It may be seen that the force bringing the two objects closer is proportional to the product of two objects' masses. It is also proportional to the momentum absorption coefficient of the objects to particles, and to

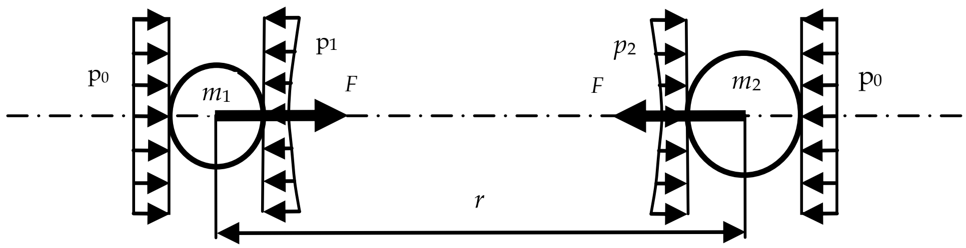

Figure 1. The impact of microparticles making the two objects closing to each other.

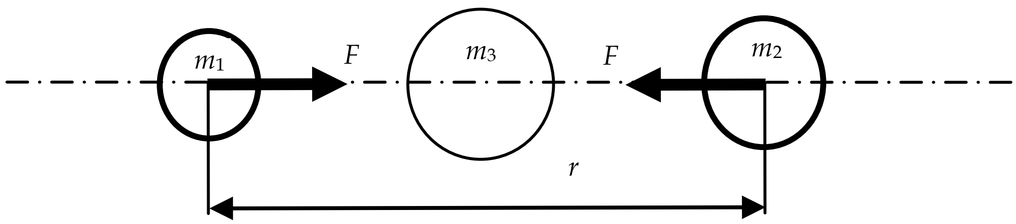

Figure 2. The effect of intermediate substances on the force between two objects.

the density of the original momentum field in the space that objects exist. But it is inversely proportional to the square of the distance between the two objects.

In different locations, at different times, the density of the momentum field of microparticles may be different, and the momentum absorption coefficient of the objects to particles may also be different. Therefore, the universal attraction between two objects may be different.

Put an object whose mass is m_3 between two objects in Figure 1, as shown in Figure 2. Based on the above analysis, the added object m_3 affects the interaction force between m_1 and m_2. It is only when the micro-particle momentum absorption coefficient of m_3 is zero, that m_3 does not interact with the group of microparticles, the universal attraction forces of m_1 and m_2 were not related to the intermediary m_3. Because in the universe, a substance that does not interact with other particles does not exist, the attracting force between two objects is related to the intermediary substances.

If "$k_1 k_2 p_0 / A$" in (6) is replaced by "G", we then have the universal attraction formula (1) of Newton. From the analysis above, the universal attraction coefficient $G = 6.67 \times 10^{-11} \mathrm{N \cdot m^2/kg^2}$ is appropriate to the earth and nearby celestial bodies, but may not apply to other celestial bodies. This is the reason why using the law of universal attraction for astronomical calculation sometimes appears to have large errors.

CONCLUSIONS

1) The theory of momentum exchange between objects and microparticles may allow us to interpret the source of universal attraction more reasonably, as well as allow us to calculate the related formula. Universal attraction is an equivalent expression for momentum exchange between objects and microparticles, generating the force on the line of centers of the two objects when they are close to each other.

2) The universal attraction constant $G = 6.67 \times 10^{-11} \mathrm{N.m^2/kg^2}$ is only accurate for astronomical bodies near the earth.

3) The universal attraction between two objects is related to the intermediary between them.

4) There is no graviton.

COMPARING FINDINGS WITH ALREADY PUBLISHED FINDINGS IN THE LITERATURE

1) In this paper, microparticles push two objects closer. In already published papers, graviton attracts two objects closer.

2) Microparticles push two objects closer is reasonable. Graviton attracts two objects closer is not reasonable.

3) This paper explains why the force bringing the two objects closer is proportional to the product of two objects' masses and inversely proportional to the square of the distance between the two objects. Already published papers explain none.

4) This paper predicts that the universal attraction constant $G = 6.67 \times 10^{-11} \mathrm{N.m^2/kg^2}$ is only accurate for astronomical bodies near the earth. Already published papers hold that the universal attraction constant G is the same in the universe.

5) This paper concludes that the universal attraction between two objects is related to the intermediary between them. Already published papers hold that the

universal attraction between two objects has nothing to do with the intermediary between them.

6) This paper denies the existence of graviton. Already published papers hold the existence of graviton.

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