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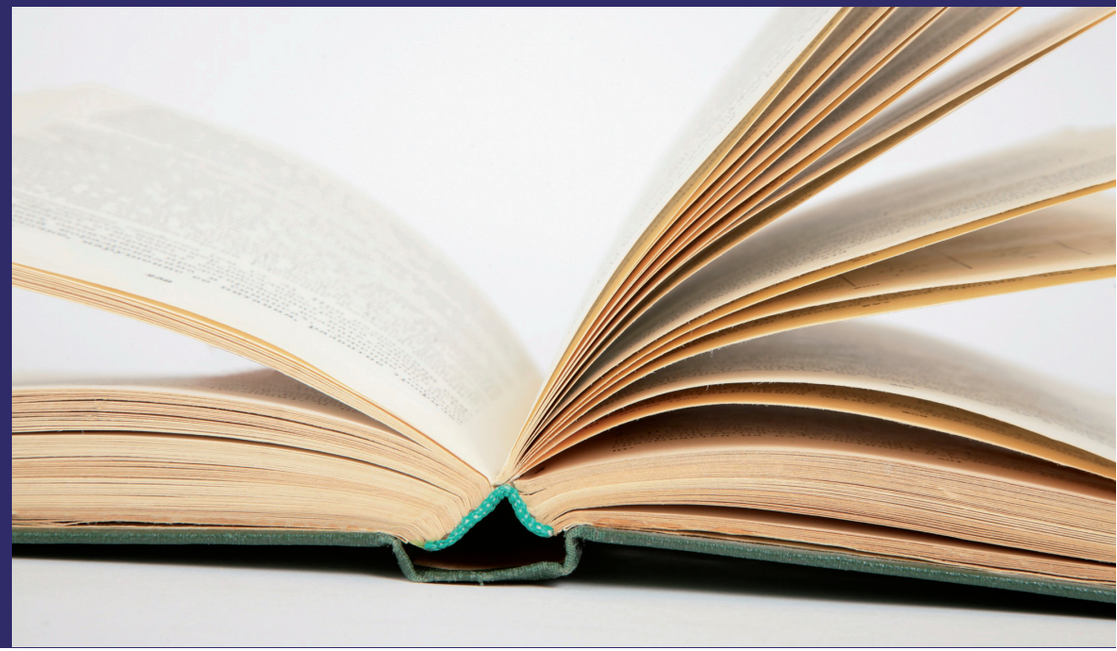

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New Newton Mechanics and Related Problems

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New Newton Mechanics and Related Problems

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Introduction

Many scholars believe that Einstein surpassed the achievements of Newton, and the examples are that Einstein solved the problems of advance of Mercury's perihelion and deflection of photon around the Sun. However, an interesting question is: if Newton knew these problems, he cannot solve these problems? According to our opinion, Newton was able to solve these problems. Namely, the problems of advance of Mercury's perihelion and deflection of photon around the Sun can be solved within the framework of mechanics system established by Newton.

As faithful follower of Newton, we try to "represent" Newton to solve the problems of advance of Mercury's perihelion and deflection of photon around the Sun. Of course, we use the methods of New Newton Mechanics taking law of conservation of energy as unique source law, rather than the original methods of Newton mechanics.

Chapter 1: New Newton Mechanics Taking Law of Conservation of Energy as Unique Source Law

New Newton Mechanics Taking Law of Conservation of Energy as Unique Source Law

Abstract: According to the principle of the uniqueness of truth, this paper presents the New Newton Mechanics (NNM) taking law of conservation of energy as unique source law. Examples show that in some cases other laws may be contradicted with the law of conservation of energy. The original Newton's three laws and the law of gravity, in principle can be derived by the law of conservation of energy. Through the example of free falling body, this paper derives the original Newton's second law and the original law of gravity by using the law of conservation of energy; and through the example of a small ball rolls along the inclined plane (belonging to the problem cannot be solved by general relativity that a body is forced to move in flat space), derives improved Newton's second law and improved law of gravity by using law of conservation of energy. Whether or not other conservation laws (such as the law of conservation of momentum and the law of conservation of angular momentum) can be utilized, should be tested by law of conservation of energy. When the original Newton's second law is not correct, then the laws of conservation of momentum and angular momentum are no longer correct; therefore the general forms of improved law of conservation of momentum and improved law of conservation of angular momentum are presented. In the cases that law of conservation of energy cannot be used effectively, New Newton Mechanics will not exclude that according to other theories or accurate experiments to derive the laws or formulas to solve some specific problems. For example, with the help of the result of general relativity, the improved Newton's formula of universal gravitation can be derived, which can be used to solve the problem of advance of planetary perihelion and the problem of deflection of photon around the Sun. Again, according to accurate experimental result, the synthesized gravitational formula (including the effects of

other celestial bodies and sunlight pressure) for the problem of deflection of photon around the Sun is presented. Unlike the original Newton Mechanics, in New Newton Mechanics, for different problems, may have different laws of motion, different formulas of gravity, as well as different expressions of energy. For example, for the problem of a small ball rolls along the inclined plane, and the problem of advance of planetary perihelion, the two formulas of gravity are completely different. Appendix: Solving Problems of Advance of Mercury's Perihelion and Deflection of Photon Around the Sun with New Newton's Formula of Gravity. Appendix: Solving Problems of Advance of Mercury's Perihelion and Deflection of Photon Around the Sun with New Newton's Formula of Gravity.

Keywords: Uniqueness of truth, law of conservation of energy, unique source law, New Newton Mechanics (NNM)

1 Introduction

One of the development trends of natural science is using fewer laws to solve increasing problems. In this process, some laws will play the increasingly great roles; while others will play the smaller roles, or even disappear from the ranks of laws.

Now we discuss the law of conservation of energy. Its main contents are as follows: In a closed system, the total energy of this system remains unchanged.

Because the law of conservation of energy is the most important one in natural sciences, it should play an increasingly great role. For this reason and according to the principle of the uniqueness of truth, this paper presents the New Newton Mechanics (NNM) taking law of conservation of energy as unique source law.

In the area of Newton Mechanics, there should be one truth only. Other so-called truth, either it can be derived by the unique truth, or we can prove that in certain cases it is not true. As well-known, when Newton founded the classical mechanics, four laws were proposed, they were Newton's three laws and the law of gravity. If the law of conservation of energy is choosing as the unique source law, that in principle, all the Newton's four laws can be derived according to the law of conservation of energy; after studying carefully we found that this may indeed be the real case. In addition, in the areas such as physics, mechanics, engineering and so on, there are three very important laws: the law of conservation of energy, the law of conservation of momentum and the law of conservation of angular momentum. If we believe that the law of conservation of energy is the truth, then for the law of conservation of momentum and the law of conservation of angular momentum, either they can be derived by the law of conservation of energy, or we can prove that in certain cases they are not true. We believe that the true situation is the latter, namely, the law of conservation of momentum and the law of conservation of angular momentum are not true in some cases (or their results are contradicted to the law of conservation of energy). Of course, we can also find that in some cases, these two laws still can be used. Taking the example that a man walks along the car located on the horizontal smooth rail, we can see that at present in the area of Newton mechanics, some people do not notice the case of the contradiction between the law of conservation of energy and the law of conservation of momentum.

2 Taking Law of Conservation of Energy as Unique Source Law

2.1 Deriving Original Newton's Second Law and Original Law of Gravity

2.1.1 Deriving Original Newton's Second Law by Using Law of Conservation of Energy

In this section, only Newton's second law can be derived, but we have to apply the law of gravity at the same time, so we present the general forms of Newton's second law and the law of gravity with undetermined constants firstly.

Assuming that for the law of gravity, the related exponent is unknown, and we only know the form of this formula is as follows

$$F = -\frac{G M m}{r^D}$$

where: D is an undetermined constant, in the next section we will derive that its value is equal to 2.

Similarly, assuming that for Newton's second law, the related exponent is also unknown, and we only know the form of this formula is as follows

$$F = ma^{D'}$$

where: D' is an undetermined constant, in this section we will derive that its value is equal to 1.

As shown in Figure 1, supposing that circle O' denotes the Earth, M denotes its mass; m denotes the mass of the small ball (treated as a mass point P), A O' is a plumb line, and coordinate y is parallel to AO'. The length of AC is equal to H, and O'C equals the radius R of the Earth.

We also assume that it does not take into account the motion of the Earth and only considering the free falling of the small ball in the gravitational field of the Earth (from point A to point C).

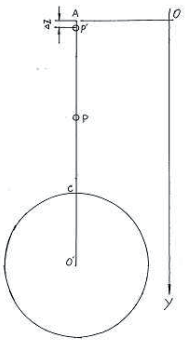

Figure 1 A small ball free falls in the gravitational field of the Earth

For this example, the value of v_{P}^2 which is the square of the velocity for the small ball located at point P will be investigated. To distinguish the quantities calculated by different methods, we denote the value given by the law of gravity and Newton's second law as v_{P}^2, while v'^2_{P} denotes the value given by the law of conservation of energy.

Now we calculate the related quantities according to the law of conservation of energy.

From the law of gravity contained undetermined constant, the potential energy of the small ball located at point P is as follows

$$V = -\frac{GMm}{(D-1)r_{O'P}^{D-1}}$$

According to the law of conservation of energy, we can get

$$-\frac{GMm}{(D-1)r_{O'A}^{D-1}} = \frac{1}{2}mv'^2_P - \frac{GMm}{(D-1)r_{O'P}^{D-1}}$$

And therefore

$$v'^2_P = \frac{2GM}{D-1}[\frac{1}{r_{O'P}^{D-1}} - \frac{1}{(R+H)^{D-1}}]$$

Now we calculate the related quantities according to the law of gravity and Newton's second law.

For the small ball located at any point P, we have

$$dv/dt = a$$

We also have

$$dt = \frac{dy}{v}$$

Therefore

$$vdv = ady$$

According to the law of gravity contained undetermined constant, along the plumb direction, the force acted on the small ball is as follows

$$F_a = \frac{GMm}{r_{O'P}^{D}}$$

From the Newton's second law contained undetermined constant , it gives

$$a = (\frac{F_a}{m})^{1/D'} = (\frac{GM}{r_{O'P}^{D}})^{1/D'}$$

Then we have

$$vdv = \{\frac{GM}{(R+H-y)^D}\}^{1/D'}dy$$

For the two sides of this expression, we run the integral operation from A to P, it gives

$$v_P^2 = 2(GM)^{1/D'}\int_0^{y_p}(R+H-y)^{-D/D'}dy$$

$$v_P^2 = 2(GM)^{1/D'}\{-\frac{1}{1-D/D'}[(R+H-y)^{1-D/D'}]\Big|_0^{y_p}\}$$

$$v_P^2 = \frac{2(GM)^{1/D'}}{(D/D')-1}[\frac{1}{r_{O'P}^{(D/D')-1}} - \frac{1}{(R+H)^{(D/D')-1}}]$$

Let $v_P^2 = v_P'^2$, then we should have: $1 = 1/D'$, and $D-1 = (D/D')-1$; these two equations all give: $D' = 1$, this means that for free falling problem, by using the law of conservation of energy, we strictly derive the original Newton's second law $F = ma$.

Here, although the original law of gravity cannot be derived (the value of D may be any constant, certainly including the case that D=2), we already prove that the original law of gravity is not contradicted to the law of conservation of energy, or the original law of gravity is tenable accurately.

2.1.2 Deriving Original Law of Gravity by Using Law of Conservation of Energy

In order to really derive the original law of gravity for the example of free falling problem, we should consider the case that a small ball free falls from point A to point P' (point P' is also shown in Figure1) through a very short distance ΔZ (the two endpoints of the interval ΔZ are point A and point P').

As deriving the original Newton's second law, we already reach

$$v'^2_{P'} = \frac{2GM}{D-1}[\frac{1}{(R+H-\Delta Z)^{D-1}} - \frac{1}{(R+H)^{D-1}}]$$

where: $R+H-\Delta Z = r_{O'P'}$

For the reason that the distance of ΔZ is very short, and in this interval the gravity can be considered as a linear function, therefore the work W of gravity in this interval can be written as follows

$$W = F_{av}\Delta Z = \frac{GMm}{(R+H-\frac{1}{2}\Delta Z)^D}\Delta Z$$

where, F_{av} is the average value of gravity in this interval ΔZ, namely the value of gravity for the midpoint of interval ΔZ.

Omitting the second order term of ΔZ ($\frac{1}{4}(\Delta Z)^2$), it gives

$$W = \frac{GMm\Delta Z}{(R^2+H^2+2RH-R\Delta Z-H\Delta Z)^{D/2}}$$

As the small ball free falls from point A to point P', its kinetic energy is as follows

$$\frac{1}{2}mv'^2_{P'} = \frac{GMm}{D-1}[\frac{(R+H)^{D-1}-(R+H-\Delta Z)^{D-1}}{(R^2+H^2+2RH-R\Delta Z-H\Delta Z)^{D-1}}]$$

According to the law of conservation of energy, we have

$$W = \frac{1}{2}mv'^2_{P'}$$

Substituting the related quantities into the above expression, it gives

$$\frac{GMm}{D-1}\left[\frac{(R+H)^{D-1}-(R+H-\Delta Z)^{D-1}}{(R^2+H^2+2RH-R\Delta Z-H\Delta Z)^{D-1}}\right]$$

$$=\frac{GMm\Delta Z}{(R^2+H^2+2RH-R\Delta Z-H\Delta Z)^{D/2}}$$

To compare the related terms, we can reach the following three equations

$$D-1=1$$

$$D/2=D-1$$

$$\Delta Z=(R+H)^{D-1}-(R+H-\Delta Z)^{D-1}$$

All of these three equations will give the following result

$$D=2$$

Thus, we already derive the original law of gravity by using the law of conservation of energy.

2.2 New Three Laws of Motion and New Law of Gravity (Formula) Created By Law of Conservation Of Energy for New Newton Mechanics

The original Newton's three laws of motion are as follows.

Newton's First Law of Motion: Every object in a state of uniform motion (or at rest) tends to remain in that state of motion (or at rest) unless an external force is applied to it. For short: rest remains rest, and moving remains moving.

Newton's Second Law of Motion: The relationship between an object's mass m, its acceleration a, and the applied force F is F = ma. The direction of the force is the same as the direction of the acceleration.

Newton's Third Law of Motion: For every action there is an equal and opposite reaction.

The original Newton's law of gravity: The attractive force between two objects is as follows

$$F=-\frac{GMm}{r^2} \qquad (1)$$

While for NNM, taking law of conservation of energy as unique source law, then we have the following NNM's three laws of motion and law of gravity.

NNM's First Law of Motion: Every object in a state of uniform motion (or in a state of uniform rotation, or at rest) tends to remain in that state of motion (or in a state of uniform rotation, or at rest) unless an external force is applied to it; otherwise the law of conservation of energy will be destroyed. For short: rest remains rest, moving remains moving, and rotating remains rotating.

NNM's Second Law of Motion: The relationship between an object's mass m, its acceleration a, and the applied force F is a function that should be derived by law of conservation of energy. The direction of the force is the same as the direction of the acceleration. In general, the function can be written as the form of variable dimension

fractal: $F = ma^{1+\varepsilon}$, where: ε is a constant or a variable. For different problems, the forms of second law may be different.

NNM's Third Law of Motion: In general, for every action there is an equal and opposite reaction. In special case, the function relationship between action and reaction should be derived by law of conservation of energy. The improved form of the original Newton's third law ($F_{AB} = -F_{BA}$) is as follows: $F_{AB} = -F_{BA}^{1+\lambda}$, where: λ is a constant or a variable. For different problems, the forms of third law may be different.

NNM's law (formula) of gravity: The attractive force between two objects is a function that should be derived by law of conservation of energy, or experimental data; or derived with the help of other theories. For different problems, the forms of law (formula) of gravity may be different. The results of original Newton's law of gravity are only accurate in the cases that two objects are relative static or running the straight line between one center and another center, and the like; for other cases its results are all approximate. In general, NNM's law (formula) of gravity may be taken as the form that adding the amending term to original Newton's law of gravity, or the following form of variable dimension fractal:

$$F = -\frac{G M m}{r^{2-\delta}} \qquad (2)$$

where: δ is a constant or a variable.

Now for an example, a NNM's law (formula) of gravity (an improved Newton's law of gravity) and a NNM's second law of motion (an improved Newton's second law of motion), they are suitable for this example only, are derived simultaneously by law of conservation of energy.

Firstly, the variational principles established by the law of conservation of energy can be given with least squares method (LSM).

Supposing that the initial total energy of a closed system equals $W(0)$, and for time t the total energy equals $W(t)$, then according to the law of conservation of energy:

$$W(0) = W(t) \qquad (3)$$

This can be written as:

$$R_W = \frac{W(t)}{W(0)} - 1 = 0 \qquad (4)$$

According to LSM, for the interval $[t_1, t_2]$, we can write the following variational principle:

$$\Pi = \int_{t_1}^{t_2} R_W^2 dt = \min \qquad (5)$$

where: $\min_0$ denotes the minimum value of functional Π and it should be equal to zero.

It should be noted that, in many cases $W(t)$ is approximate, and R_W is not identically equal to zero, therefore Eq.(5) can be used to solve the problem.

Besides the time coordinate, another one can also be used. For example, for interval $[x_1, x_2]$, the following variational principle can be given according to the law of conservation of energy:

$$\Pi = \int_{x_1}^{x_2} R_W^2 dx = \min_0 \qquad (6)$$

The above-mentioned principles are established by using the law of conservation of energy directly. Sometimes, a certain principle should be established by using the law of conservation of energy indirectly. For example, a special physical quantity Q may be interested，not only it can be calculated by using the law of conservation of energy, but also can be calculated by using other laws (for this paper they are the law of gravity, and Newton's second law). For distinguishing the values, let's denote the value given by other laws as Q，while denote the value given by the law of conservation of energy as Q'，then the value of R_W can be redefined as follows:

$$R_W = \frac{Q}{Q'} - 1 = 0 \qquad (7)$$

Substituting Eq.（7）into Eqs.（5）and（6），as Q' is the result calculated with the law of conservation of energy, it gives the variational principle established by using the law of conservation of energy indirectly. Otherwise, it is clear that the extent of the value of Q accords with Q'.

Substituting the related quantities into Eq.（5）or Eq.（6），the equations derived by the condition of an extremum can be written as follows:

$$\frac{\partial \Pi}{\partial a_i} = \frac{\partial \Pi}{\partial k_i} = 0 \qquad (8)$$

After solving these equations, the improved law of gravity, and Newton's second law can be reached at once. According to the value of Π, the effect of the solution can be judged. The nearer the value of Π is to zero, the better the effect of the solution. It should be noted that besides of solving equations, optimum-seeking methods could also be used for finding the minimum and the constants to be determined. In fact, the optimum seeking method will be used in this paper.

Now we solve an example. As shown in Fig.2, supposing that the small ball rolls along a long incline from A to B. Its initial velocity is zero and the friction and the rotational energy of small ball are neglected.

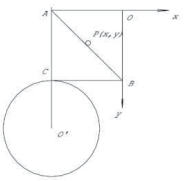

Figure.2 A small ball rolls from *A* to *B*

Supposing that circle O' denotes the Earth, M denotes its mass; m denotes the mass of the small ball (treated as a mass point P), O'A is a plumb line, coordinate x is orthogonal to O'A, coordinate y is orthogonal to coordinate x (parallel to O'A), BC is orthogonal to O'A. The lengths of OA, OB, BC, and AC are all equal to H, and O'C equals the radius R of the Earth.

In this example, the value of v_{P}^2 which is the square of the velocity for the ball located at point P is investigated. To distinguish the quantities, denote the value given by the improved law of gravity and improved Newton's second law as v_{P}^2, while v'^2_{P} denotes the value given by the law of conservation of energy, then Eq.（6）can be written as

$$\Pi = \int_{-H}^{0} (\frac{v_P^2}{v'^2_P} - 1)^2 dx = \min_0 \qquad (9)$$

Supposing that the improved law of gravity and improved Newton's second law can be written as the following constant dimension fractal forms

$$F = -\frac{GMm}{r^D} \qquad (10)$$

$$F = ma^{1+\varepsilon} \qquad (11)$$

where: D and ε are constants.

Now we calculate the related quantities according to the law of conservation of energy.

From Eq.(10), the potential energy of the small ball located at point P is

$$V = -\frac{GMm}{(D-1)r_{O'P}^{D-1}} \qquad (12)$$

According to the law of conservation of energy, we can get

$$-\frac{GMm}{(D-1)r_{O'A}^{D-1}} = \frac{1}{2}mv'^2_P - \frac{GMm}{(D-1)r_{O'P}^{D-1}} \qquad (13)$$

And therefore

$$v'^2_P = \frac{2GM}{D-1}\left[\frac{1}{r^{D-1}_{O'P}} - \frac{1}{(R+H)^{D-1}}\right] \qquad (14)$$

Now we calculate the related quantities according to the improved law of gravity and improved Newton's second law.

Supposing that the equation of rolling line is

$$y = x + H \qquad (15)$$

For the ball located at point P,

$$dv/dt = a \qquad (16)$$

Because

$$dt = \frac{ds}{v} = \frac{\sqrt{2}dx}{v}$$

Therefore

$$vdv = a\sqrt{2}dx \qquad (17)$$

According to the improved law of gravity, the force along to the tangent is

$$F_a = \frac{GMm}{r^D_{O'P}}\frac{1}{\sqrt{2}} \qquad (18)$$

According to the improved Newton's second law, for point P, the acceleration along to the tangent is

$$a = \left(\frac{F_a}{m}\right)^{1/1+\varepsilon} = \left(\frac{GM}{r^D_{O'P}\sqrt{2}}\right)^{1/1+\varepsilon} \qquad (19)$$

From Eq.（17）, it gives

$$vdv = \left\{\frac{GM}{[(H+x)^2 + (R+H-y)^2]^{D/2}\sqrt{2}}\right\}^{1/1+\varepsilon}\sqrt{2}dx \qquad (20)$$

Substituting Eq.(15) into Eq.(20), and for the two sides, we run the integral operation from A to P, it gives

$$v^2_P = 2\int_{-H}^{x_P}\left\{\frac{GM}{[(H+x)^2 + (R-x)^2]^{D/2}}\right\}^{1/1+\varepsilon}(\sqrt{2})^{\varepsilon/1+\varepsilon}dx \qquad (21)$$

Then the value can be calculated by a method of numerical integral.

The given data are assumed to be: for Earth, GM=3.99×10^{14}m^3/s^2; the radius of the Earth R=6.37×10^{6}m, H=R/10, try to solve the problem shown in Fig. 1, find the solution for the value of v^2_B, and derive the improved law of gravity and the improved Newton's second law.

Firstly, according to the original law of gravity, the original Newton's second law (i.e., let D=2 in Eq.(10), ε=0 in Eq.(11)) and the law of conservation of energy, all the related

quantities can be calculated, then substitute them into Eq.(9), it gives

Π_0=571.4215

Here, according to the law of conservation of energy, it gives v'^2_B=1.0767×10^7, while according to the original law of gravity, and the original Newton's second law, it gives v^2_B=1.1351×10^7, the difference is about 5.4 %. For the reason that the value of Π_0 is not equal to zero, then the values of D and ε can be decided by the optimum seeking method. At present all the optimum seeking methods can be divided into two types, one type may not depend on the initial values which program may be complicated, and another type requires the better initial values which program is simple. One method of the second type, namely the searching method will be used in this paper.

Firstly, the value of D is fixed so let D=2，then search the value of ε，as ε=0.0146, the value of Π reaches the minimum 139.3429；then the value of ε is fixed，and search the value of D，as D=1.99989, the value of Π reaches the minimum 137.3238；then the value of D is fixed，and search the value of ε，as ε=0.01458, the value of Π reaches minimum 137.3231. Because the last two results are highly close, the searching can be stopped, and the final results are as follows

D=1.99989，ε=0.01458，Π=137.3231

Here the value of Π is only 24% of Π_0. While according to the law of conservation of energy, it gives v'^2_B=1.0785×10^7，according to the improved law of gravity and the improved Newton's second law, it gives v^2_B=1.1073×10^7, the difference is about 2.7 % only.

The results suitable for this example with the constant dimension fractal form are as follows

The improved law of gravity reads

$$F=-\frac{GMm}{r^{1.99989}} \tag{22}$$

The improved Newton's second law reads

$$F=ma^{1.01458} \tag{23}$$

The above mentioned results have been published on reference [1].

According to the above results, it can be said that we could not rely on any experimental data, only apply the law of conservation of energy to derive the improved law of gravity, and improved Newton's second law; and demonstrate that the original Newton's law of gravity and Newton's second law are all tenable approximately for this example.

For the example shown in Fig.2 that a small ball rolls along the inclined plane, in order to obtain the better results, we discuss the variable dimension fractal solution with Eq.(4) that is established by the law of conservation of energy directly.

Supposing that the improved Newton's second law and the improved law of gravity

with the form of variable dimension fractal can be written as follows: $F = ma^{1+\varepsilon}$, $\varepsilon = k_1 u$; $F = -GMm/r^{2-\delta}$, $\delta = k_2 u$; where: u is the horizon distance that the small ball rolls （$u = x + H$）.

With the similar searching method, the values of k_1, k_2 can be determined, and the results are as follows

$$\varepsilon = 8.85\times10^{-8}u\,,\quad \delta = 2.71\times10^{-13}u$$

The results of variable dimension fractal are much better than that of constant dimension fractal. For example, the final $\Pi = 5.8662\times10^{-4}$, it is only 0.019% of Π_0 (3.1207). While according to the law of conservation of energy, it gives v'^2_B=1.0767×10^7, according to the improved law of gravity and the improved Newton's second law, it gives v_B^2=1.0777×10^7, the difference is about 0.093 % only.

The results suitable for this example with the variable dimension fractal form are as follows

The improved law of gravity reads

$$F = -\frac{GMm}{r^{2-2.71\times10^{-13}u}} \tag{24}$$

The improved Newton's second law reads

$$F = ma^{1+8.85\times10^{-8}u} \tag{25}$$

where: u is the horizon distance that the small ball rolls （$u = x + H$）.

There is another problem should also be discussed. That is the improved kinetic energy formula. As well-known, the kinetic energy formula has been modified in the theory of relativity, now we improve the kinetic energy formula with the law of conservation of energy.

Supposing that the improved kinetic energy formula is $E_d = \frac{1}{2}mv^{2-\lambda}$, $\lambda = k_3 u$; where: u is the horizon distance that the small ball rolls （$u = x + H$）.

With the similar searching method, we can get: $k_3 = 9.95\times10^{-13}$, then the improved kinetic energy formula with variable dimension fractal form reads

$$E_d = \frac{1}{2}mv^{2-9.95\times10^{-13}u}$$

Because the effect of improvement is very small (the value of Π is only improved from 5.8662×10^{-4} into 5.8634×10^{-4}), therefore these results should be for reference

only.

3 With the Help of General Relativity and Accurate Experimental Data to Derive the Improved Newton's Formula of Universal Gravitation

Prof. Hu Ning derived an equation according to general relativity, with the help of Hu's equation and Binet's formula, we get the following improved Newton's formula of universal gravitation[2]

$$F = -\frac{GMm}{r^2} - \frac{3G^2M^2mp}{c^2r^4} \qquad (26)$$

where: G is gravitational constant, M and m are the masses of the two objects, r is the distance between the two objects, c is the speed of light, p is the half normal chord for the object m moving around the object M along with a curve, and the value of p is given by: $p = a(1-e^2)$ (for ellipse), $p = a(e^2-1)$ (for hyperbola), $p = y^2/2x$ (for parabola).

It should be noted that, this improved Newton's formula of universal gravitation can also be written as the form of variable dimension fractal.

Suppose

$$-\frac{GMm}{r^D} = -\frac{GMm}{r^2} - \frac{3G^2M^2mp}{c^2r^4}$$

It gives

$$D = -\ln(\frac{1}{r^2} + \frac{3GMp}{c^2r^4}) / \ln r$$

For the problem of gravitational defection of a photon orbit around the Sun, $M=1.99\times10^{30}$kg, $r_0=6.96\times10^8$m, $c=2.9979\times10^8$m/s, then we have: $1.954997 \le D \le 2$.

The improved Newton's universal gravitation formula (Eq.(26)) can give the same results as given by general relativity for the problem of planetary advance of perihelion and the problem of gravitational defection of a photon orbit around the Sun.

For the problem of planetary advance of perihelion, the improved Newton's universal gravitation formula reads

$$F = -\frac{GMm}{r^2} - \frac{3G^2M^2ma(1-e^2)}{c^2r^4} \qquad (27)$$

For the problem of gravitational defection of a photon orbit around the Sun, the improved Newton's universal gravitation formula reads

$$F = -\frac{GMm}{r^2} - \frac{1.5GMmr_0^2}{r^4} \qquad (28)$$

where: r_0 is the shortest distance between the light and the Sun, if the light and the Sun is tangent, it is equal to the radius of the Sun.

The funny thing is that, for this problem, the maximum gravitational force given by the improved Newton's universal gravitation formula is 2.5 times of that given by the original Newton's law of gravity.

Although the deflection angles given by Eq. (26) and Eq. (28) are all exactly the same as given by general relativity, they have still slight deviations with the precise astronomical observations. What are the reasons? The answer is that the deflection angle not only is depended on the gravitational effect of the Sun, but also depended on the gravitational effects of other celestial bodies, as well as the influences of sunlight pressure and so on. If all factors are taken into account, not only general relativity can do nothing for this problem, but also for a long time it could not be solved by theoretical method. Therefore, at present the only way to solve this problem is based on the precise observations to derive the synthesized gravitational formula (including the effects of other celestial bodies and sunlight pressure) for the problem of deflection of photon around the Sun.

As well-known, the deflection angle ϕ_0 given by general relativity or the improved Newton's formula of universal gravitation is as follows

ϕ_0=1.75”

Adding an additional term to Eq.(28), it gives the synthesized gravitational formula between the photon and the Sun as follows

$$F = -\frac{GMm}{r^2}(1+\frac{3GMp}{c^2r^2}+\frac{wG^2M^2p^2}{c^4r^4}) \qquad (29)$$

where: w is a constant to be determined.

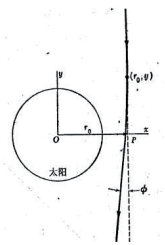

Figure 3. Deflection of photon around the Sun

Now We Determine The Value Of W According To Accurate Experimental Data.

Firstly the problem of deflection of photon around the Sun as shown in Fig.3 will be solved with Eq.(29). The method to be used is the same as presented in references [2] and [3].

Supposing that m represents the mass of photon. Because the deflection angle is very small, we can assume that $x=r_0$; thus on point (x, y), its coordinate can be written as （r_0，y）, then the force acted on photon reads

$$F_x = \frac{Fr_0}{(r_0^2+y^2)^{1/2}} \qquad (30)$$

where: The value of F is given by Eq.(29).

Because

$$mv_x = \int F_x dt = \int F_x \frac{dy}{v_y} \approx \frac{1}{c}\int F_x dy \qquad (31)$$

Hence

$$v_x \approx -\frac{2GMr_0}{c}\int_0^\infty \frac{dy}{(r_0^2+y^2)^{3/2}} - \frac{6G^2M^2pr_0}{c^3}\int_0^\infty \frac{dy}{(r_0^2+y^2)^{5/2}}$$

$$-\frac{2wG^3M^3p^2r_0}{c^5}\int_0^\infty \frac{dy}{(r_0^2+y^2)^{7/2}} \qquad (32)$$

Because

$$\int_0^\infty \frac{dy}{(r_0^2+y^2)^{3/2}} = \frac{1}{r_0^2}, \quad \int_0^\infty \frac{dy}{(r_0^2+y^2)^{5/2}} = \frac{2}{3r_0^4}, \quad \int_0^\infty \frac{dy}{(r_0^2+y^2)^{7/2}} = \frac{8}{15r_0^6}$$

Therefore

$$v_x \approx -\frac{2GM}{cr_0} - \frac{4G^2M^2p}{c^3r_0^3} - \frac{16wG^3M^3p^2}{15c^5r_0^5}$$

Because

$$\phi \approx tg\phi \approx \frac{|v_x|}{c}$$

By using the half normal chord given in reference [2], it gives

$$p = \frac{c^2r_0^2}{2GM}$$

Then the deflection angle is as follows

$$\phi = \frac{4GM}{c^2r_0}\left|1+\frac{w}{15}\right| \qquad (33)$$

where: r_0 is the radius of Sun.

Because

$$\phi_0 = \frac{4GM}{c^2r_0} \qquad (34)$$

Then, it gives

$$\phi = \phi_0(1+\frac{w}{15}) \qquad (35)$$

Thus the value of w can be solved as follows

$$w = 15(\frac{\phi}{\phi_0} - 1) \qquad (36)$$

Now we can determine the value of w according to the experimental data.

Table 1 shows the experimental data of radio astronomy for the deflection angle of

photon around the Sun (taken from reference [4]).

Table 1. The experimental data of radio astronomy for the deflection angle of photon around the Sun

Year	Observer	Observed value / ”
1969	G.A.Seielstud et al	1.77±0.20
1969	D.O.Muhleman et al	$1.82^{+0.24}_{-0.17}$
1969	I.I.Shapiro	1.80±0.2
1970	R.A.Sramak	1.57±0.08
1970	J.M.Hill	1.87±0.3
1972		1.82±0.14
1974		1.73±0.05
1975		1.78±0.02

Now we choose the experimental data in 1975, it gives

$1.76 \le \varphi \le 1.80$

Then, we have

$0.08571 \le w \le 0.42857$

Taking the average value, it gives

$w=0.25714$

Thus, according to the experimental data, the synthesized gravitational formula can be decided.

4 Contradiction between the Law of Conservation Of Energy and the Law of Conservation Of Momentum As Well As the Law of Conservation of Angular Momentum

As well-known, unlike the law of conservation of energy, the law of conservation of momentum and the law of conservation of angular momentum are only correct under certain conditions. For example, considering friction force and the like, these two laws will not be correct.

Now we point out further that for NNM the law of conservation of momentum as well as the law of conservation of angular momentum will be not correct under certain conditions (or their results contradict with the law of conservation of energy).

As well-known, in order to prove the law of conservation of momentum as well as the law of conservation of angular momentum, the original Newton's second law should be applied. However, as we have made clear, the original Newton's second law will not be correct under certain conditions, for such cases, these two laws also will not correct.

Here we find another problem, if the original three conservation laws are all correct, therefore for certain issues, the law of conservation of energy and the other two conservation laws could be combined to apply. While for NNM, if the other two conservation laws cannot be applied, how to complement the new formulas to replace these two conservation laws? The solution is very simple: according to the law of conservation of energy, for any time, the derivatives of total energy $W(t)$ should be all

equal to zero, then we have

$$\frac{d^n W(t)}{dt^n} = 0 \qquad n = 1,2,3,\cdots \qquad (37)$$

In addition, running the integral operations to the both sides of Eq.(3), it gives

$$W(0)t = \int_0^t W(t)dt \qquad (38)$$

Now we illustrate that, because there is one truth only, even within the scope of original classical mechanics, the contradiction could also appear between the law of conservation of energy and the law of conservation of momentum.

As shown in Fig.4, a man walks along the car located on the horizontal smooth rail, the length of the car equals L, the mass of the man is m_1 and the car is m_2. At beginning the man and the car are all at rest, then the man walks from one end to the other end of the car, try to decide the moving distances of the man and the car. This example is taken from references [5].

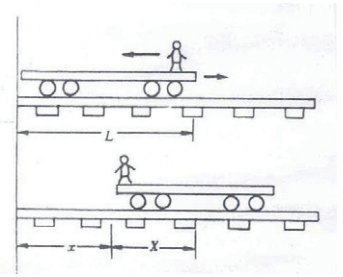

Figure 4 A Man Walks along the Car Located On the Horizontal Smooth Rail

As solving this problem by using the original classical mechanics, the law of conservation of momentum will be used, it gives

$$m_1 v_1 + m_2 v_2 = 0$$

However, at beginning the man and the car are all at rest, the total energy of the system is equal to zero; while once they are moving, they will have speeds, and the total energy of the system is not equal to zero; thus the law of conservation of energy will be destroyed. For this paradox, the original classical mechanics looks without seeing. In fact, considering the lost energy of the man and applying the law of conservation of energy, the completely different result will be reached.

As the original law of conservation of momentum ($P_t = P_0 = Const$) and the law of conservation of angular momentum ($L_t = L_0 = Const$) are not correct, we can propose their improved forms of variable dimension fractal. The improved law of conservation of momentum: $P_t = P_0^{1+\delta}$ (δ is a constant or a variable), and the improved law of

conservation of angular momentum: $L_t = L_0^{1+\varepsilon}$ (ε is a constant or a variable).

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Chapter 2: Unified Theory of Natural Science written on a T-shirt

Unified Theory of Natural Science written on a T-shirt

Abstract: The strict "unified theory" cannot exist. Referring to documents structure of public library, and applying least square method, "partial and temporary unified theory of natural science so far" including all the equations of natural science so far can be established. In this way, the theory of everything to express all of natural laws, described by Hawking that a single equation could be written on a T-shirt, is partially and temporarily realized in the form of "partial and temporary unified variational principle of natural science so far".
Key words: Unified theory, partial and temporary unified theory of natural science so far, partial and temporary unified variational principle of natural science so far, Hawking, T-shirt

Introduction

One of the reasons for 1979 Nobel Prize for physics is "for their contributions to the theory of the unified weak and electromagnetic interaction between elementary particles". While there is a conceptual mistake: the strict "unified theory" cannot exist, there is only "partial and temporary unified theory so far" (sometimes it may be simplified as "unified theory so far"). In other words, "the theory of the unified weak and electromagnetic interaction" cannot exist, and there is only "partial and temporary theory of the unified weak and electromagnetic interaction so far". In fact, not only the "unified theory" of two or more than two interactions cannot exist, but also the "unified theory" of any kind of interaction cannot exist. In other words, the "unified electromagnetic theory" cannot exist, so do the "unified gravitational theory", the "unified strong interaction theory", and the "unified weak interaction theory". However, if the "unified theory" is changed into "partial and temporary unified theory so far", then it can exist. What is the "unified theory"? In

1980, Stephen Hawking once claimed, physicists have seen the outline of "final theory", this theory of everything can express all laws of nature with a single and beautiful mathematical model, perhaps that it is so simple and can be written on a T-shirt.

In other words, for any field, the strict "unified theory" refers to that all the laws of this field can be expressed in a single mathematical model.

If following this concept to understand the strict "unified theory", we have to say, such a "unified theory" is simply cannot exist. In other words, there is only "partial and temporary unified theory so far".

Now we discuss that the strict "unified electromagnetic theory" cannot exist.

1 Why the strict "unified electromagnetic theory" cannot exist and applying least square method to establish "partial and temporary unified electromagnetic theory so far"

It might be argued that Maxwell's equations are "unified electromagnetic theory". Facing with this argument, we ask three questions. First, whether or not all the electromagnetic laws can be included or derived by Maxwell's equations? Second, whether or not the later appeared high temperature superconductivity problem and the like can be solved by Maxwell's equations? Third, whether or not the faster-than-light （FTL） problems can be solved by Maxwell's equations? If negative answers were given to these three questions, then it should be acknowledged that Maxwell's equations are not strict "unified electromagnetic theory", but only "partial and temporary unified electromagnetic theory".

Based on the same reason, the "theory of the unified weak and electromagnetic interaction" cannot exist, and there is only "partial and temporary theory of the unified weak and electromagnetic interaction so far".

Now, referring to documents structure of public library (here it means that the public library contains various books and literatures), we establish the "partial and temporary unified electromagnetic theory so far".

First of all, for any field, applying least square method to establish this field's "partial and temporary unified theory so far" (the corresponding expression is "partial and temporary unified variational principle so far").

Supposing that for a certain domain Ω, we already establish the following general equations

$$F_i = 0 \qquad (i = 1,2 \to n) \tag{1}$$

On boundary V, the boundary conditions are as follows

$$B_j = 0 \qquad (j = 1,2 \to m) \tag{2}$$

Applying least square method, for this field and the domains and boundary conditions the "partial and temporary unified theory so far" can be expressed in the following form of "partial and temporary unified variational principle so far"

$$\Pi = \sum_1^n W_i \int_\Omega F_i^2 d\Omega + \sum_1^m W_j' \int_V B_j^2 dV = \min_0 \tag{3}$$

where: $\min_0$ was introduced in reference [1], indicating the minimum and its value

should be equal to zero. W_i and W_j' are suitable positive weighted constants; for the simplest cases, all of these weighted constants can be taken as 1. If only a certain equation is considered, we can only make its corresponding weighted constant is equal to 1 and the other weighted constants are all equal to 0.

By using this method, we already established the "partial and temporary unified water gravity wave theory so far" and the corresponding "partial and temporary unified water gravity wave variational principle so far" in reference [2]; and established the "partial and temporary unified theory of fluid mechanics so far" and the corresponding "partial and temporary unified variational principle of fluid mechanics so far" in reference [3].

Some scholars may said, this is simply the application of least square method, our answer is: the simplest way may be the most effective way.

It should be noted that, due to that time we cannot realize that the strict "unified theory" cannot exist, therefore in references [2] and [3], the wrong ideas that "unified water gravity wave theory", "unified water gravity wave variational principle", "unified theory of fluid mechanics" and "unified variational principle of fluid mechanics" were appeared. Now we correct these mistakes in this paper.

It should also be noted that, Eq.(2) can be included in Eq.(1), therefore we will only discuss Eq.(1), rather than discuss Eq.(2).

Now we write Maxwell's equations as follows

$$F_1 = 0, \qquad \text{in domain } \Omega_1$$

where: $F_1 = \nabla \bullet D - \rho$

$$F_2 = 0, \qquad \text{in domain } \Omega_2$$

where: $F_2 = \nabla \times E + \partial B / \partial t$

$$F_3 = 0, \qquad \text{in domain } \Omega_3$$

where: $F_3 = \nabla \bullet B$

$$F_4 = 0, \qquad \text{in domain } \Omega_4$$

where: $F_4 = \nabla \times H - j - \partial D / \partial t$

In addition, for isotropic medium, the following equations should be added

$$F_5 = 0, \qquad \text{in domain } \Omega_5$$

where: $F_5 = D - \varepsilon_0 \varepsilon_r E$

$$F_6 = 0, \qquad \text{in domain } \Omega_6$$

where: $F_6 = B - \mu_0 \mu_r H$

$F_7 = 0$, in domain Ω_7

where: $F_7 = j - \gamma E$

Besides these equations, the Coulomb's law reads

$F_8 = 0$, in domain Ω_8

where: $F_8 = f - \frac{kq_1q_2}{r^2}$, according to the experimental data, k =9.0×10^{9}N·m²/C².

Due to limited space, other equations of electromagnetism are no longer listed. Also, a number of conservation equations (such as the equation of conservation of energy), and a number of laws (such as the law of composition of velocities), are also no longer listed. All of them will be discussed below.

In addition, some solitary equations established only for the solitary points or special cases can be written as follows

$$S_j = 0 \qquad (j = 1,2 \to m) \qquad (4)$$

For example, the scale factor in the Coulomb's law can be written as the following solitary equation

$S_1 = 0$

where: $S_1 = k - 9.0\times10^9$N·m²/C²。

Another example is that, in plasma problem, the shielding distance (Debye distance) can be written as the following solitary equation

$S_2 = 0$

where: $S_2 = D - \sqrt{\varepsilon_0 kT / ne^2}$.

Also due to limited space, other electromagnetic solitary equations are no longer listed.

For the reason that some solitary equations cannot be run the integral process, they will be run the square sum process.

Applying least square method, "partial and temporary unified electromagnetic theory so far" can be expressed in the following form of "partial and temporary unified electromagnetic variational principle so far"

$$\Pi_{\mathrm{EM}} = \sum_1^n W_i \int_{\Omega_i} F_i^2 d\Omega_i + \sum_1^m W_j' S_j^2 = \min_0 \qquad (5)$$

where: the subscript EM denotes that the suitable scope is the electromagnetism, all of the equations $F_i = 0$ denote so far discovered (derived) all of the equations related to electromagnetism, all of the equations $S_i = 0$ denote so far discovered (derived) all of

the solitary equations related to electromagnetism, and W_i and W_j' are suitable positive weighted constants.

Clearly, here n and m are all very large integers.

2 Applying least square method to establish "partial and temporary unified gravitational theory so far"

Firstly, it should be noted that, for different gravitational problems, the different formulas or different gravitational theories should be applied. The "universal gravitational formulas or equations" actually cannot exist. For this conclusion, many scholars do not realize it. In addition, all of the different gravitational formulas can be written as the form of Eq.(1) (namely the form that the right side of the expression is equal to zero).

The first formula should be mentioned is Newton's universal gravitational formula

$$F = -\frac{GMn}{r^2} \qquad (6)$$

It can be written as the following form

$$F_1 = 0 \qquad (6')$$

where: $F_1 = F + \frac{GMm}{r^2}$

Prof. Hu Ning derived an equation according to general relativity, with the help of Hu's equation and Binet's formula, in reference [4] we derived the following improved Newton's formula of universal gravitation

$$F = -\frac{GMm}{r^2} - \frac{3G^2M^2mp}{c^2r^4} \qquad (7)$$

where: G is gravitational constant, M and m are the masses of the two objects, r is the distance between the two objects, c is the speed of light, p is the half normal chord for the object m moving around the object M along with a curve, and the value of p is given by: p = $a(1-e^2)$ (for ellipse), p = $a(e^2-1)$ (for hyperbola), p = $y^2/2x$ (for parabola).

This formula can give the same results as given by general relativity for the problem of planetary advance of perihelion and the problem of gravitational defection of a photon orbit around the Sun.

It can be written as the following form

$$F_2 = 0 \qquad (7')$$

where: $F_2 = F + \frac{GMm}{r^2} + \frac{3G^2M^2mp}{c^2r^4}$

In some cases, we should also consider the following gravitational formula including three terms

$$F = -\frac{GMm}{r^2}(1 + \frac{3GMp}{c^2 r^2} + \frac{wG^2 M^2 p^2}{c^4 r^4}) \qquad (8)$$

where: w is a constant to be determined.

It can be written as the following form

$$F_3 = 0 \qquad (8')$$

where: $F_3 = F + \frac{GMm}{r^2}(1 + \frac{3GMp}{c^2 r^2} + \frac{wG^2 M^2 p^2}{c^4 r^4})$

But for the example that a small ball rolls along the inclined plane in the gravitational field of the Earth, all of the above mentioned formulas cannot be applied. In reference [5], we present the following gravitational formula with the variable dimension fractal form (the fractal dimension is variable, instead of constant).

$$F = -GMm/r^{2-\delta} \qquad (9)$$

where: $\delta = 1.206 \times 10^{-12} u$, u is the horizon distance that the small ball rolls.

It can be written as the following form

$$F_4 = 0 \qquad (9')$$

where: $F_4 = F + GMm / r^{2-\delta}$

In addition, the gravitational field equations of Einstein's theory of general relativity, and the gravitational formula and gravitational equations derived by other scholars, can also be written as the form of Eq.(1) (namely the form that the right side of the expression is equal to zero).

In some cases, when dealing with gravitational problem, we should also consider some principle of conservation, such as the principle of conservation of energy. Here we write the principle of conservation of energy as the form of Eq.(1) (namely the form that the right side of the expression is equal to zero). So do the other principles of conservation.

In references [5], we discussed two cases to apply the principle of conservation of energy directly and indirectly.

To apply the principle of conservation of energy directly is as follows.

Supposing that the initial total energy of a closed system is equal to $W(0)$, and for time t the total energy is equal to $W(t)$, then according to the principle of conservation of energy, it gives

$$W(0) = W(t) \qquad (10)$$

It can be written as the following form

$$F_5 = \frac{W(t)}{W(0)} - 1 = 0 \qquad (11)$$

To apply the principle of conservation of energy indirectly is as follows.

Supposing that we are interested in a special physical quantity Q, not only it can be calculated by using the principle of conservation of energy, but also can be calculated by using other gravitational formula. For distinguishing the values, let's denote the value given by other laws as Q, while denote the value given by the principle of conservation of energy as Q', then the equation to apply the principle of conservation of energy indirectly is as follows

$$F_6 = \frac{Q}{Q'} - 1 = 0 \qquad (12)$$

Now we discuss some solitary equations established only for the solitary points or special cases.

The first one is the solitary equation about the gravitational constant.

$$S_1 = G - 6.67 \times 10^{-11}\,\mathrm{N \cdot m^2/kg^2} = 0 \qquad (13)$$

The second one is considering the deflection angle for the problem of gravitational defection of a photon orbit around the Sun.

By using general relativity or improved Newton's formula of universal gravitation (namely Eq.(7)), the deflection angle ϕ_0 reads

ϕ_0 =1.75”

However, according to the experiment, we should have ϕ =1.77±0.20, taking the average, it gives

ϕ =1.77”

According to this expression, the corresponding solitary equation is as follows

$$S_2 = \phi - 1.77'' = 0 \qquad (14)$$

Other solitary equations include: the solitary equations established by the values of planetary advance of perihelion, the solitary equations established by the unusual values of gravity at different times during total solar eclipse, and the like. Due to the limited space, they are no longer listed.

Applying least square method, "partial and temporary unified gravitational theory so far" can be expressed in the following form of "partial and temporary unified gravitational variational principle so far"

$$\Pi_{\mathrm{GRAVITY}} = \sum_{1}^{n} W_i \int_{\Omega_i} F_i^2 d\Omega_i + \sum_{1}^{m} W_j' S_j^2 = \min \qquad (15)$$

where: the subscript GRAVITY denotes that the suitable scope is the gravity, all of the

equations $F_i = 0$ denote so far discovered (derived) all of the equations related to gravity, all of the equations $S_i = 0$ denote so far discovered (derived) all of the solitary equations related to gravity, and W_i and W_j' are suitable positive weighted constants.

It should be noted that, as we establish "partial and temporary unified theory so far" and the corresponding "partial and temporary unified variational principle so far", the including phenomenon is allowed. For example, the three terms gravitational formula Eq.(8) includes Eq.(7), while Eq.(7) includes Eq.(6). But we still consider these three equations simultaneously. This is because that, in some cases Eq.(7) is more convenient; as for Eq.(6), it is enough in most cases, moreover, putting Eq.(6) at the most prominent position, express our respect to Newton who is the greatest scientist in the history. In addition, the coexisting phenomenon is also allowed. For example, the gravitational formulas of classical mechanics, the gravitational field equations of Einstein's theory of general relativity, and the equations of other gravitational theories are coexisting. For the solution that is satisfying two or more than two theories simultaneously, or solving the problems in different fields simultaneously, and the like, we will discuss them in other papers (such solutions may only be reached with the method of variational principle).

Now we discuss the applications of variational principle Eq.(15).

Example 1. Setting $W_2 = 1$ and $W_1' = 1$ in variational principle Eq.(15), and other weighted constants are all equal to 0, namely applying Eq.(7) and Eq.(13) to derive the changing rule for the gravitational coefficient G' (instead of the gravitational constant G) and make the gravitational formula in accordance with the inverse square law.

In references [6], changing Eq.(7) into the following form in accordance with the inverse square law

$$F = -\frac{G'Mm}{r^2}$$

It gives

$$-\frac{G'Mm}{r^2} = -\frac{GMm}{r^2} - \frac{3G^2M^2mp}{c^2r^4}$$

Then we have the changing rule for the gravitational coefficient G' as follows

$$G' = G(1 + \frac{3GMp}{c^2r^2}) \qquad (16)$$

For problem of Mercury's advance of perihelion, we have

$$(1 + 5.038109 \times 10^{-8})G \le G' \le (1 + 1.162308 \times 10^{-7})G$$

For problem of gravitational defection of a photon orbit around the Sun, we have

$$G \le G' \le 2.5G$$

Example 2. Setting $W_4 = 1$ and $W_6 = 1$ in variational principle Eq.(15), and other weighted constants are all equal to 0, namely applying Eq.(9) and Eq.(12) to determine the unknown δ in Eq.(9).

According to Eq.(12), variational principle Eq.(15) can be simplified into the following form applied the law of conservation of energy indirectly

$$\Pi = \int_{x_1}^{x_2} (\frac{Q}{Q'} - 1)^2 dx = \min_0 \qquad (17)$$

The solution procedure can be found in reference [5]. For the final optimum approximate solution, the value of Π calculated by the improved universal gravitational formula and improved Newton's second law is equal to 0.1906446, it is only 0.033% of the value of Π_0 calculated by the original universal gravitational formula and original Newton's second law.

Example 3. Setting $W_3 = 1$ and $W_2' = 1$ in variational principle Eq.(15), and other weighted constants are all equal to 0, namely applying Eq.(8) and Eq.(14) to determine the unknown w in Eq.(8).

The solution procedure can be found in reference [6], the final result is as follows.

The range of value of w is as follows

$0.08571 \leq w \leq 0.42857$

Taking the average, it gives

$w = 0.25714$

For the problem of gravitational defection of a photon orbit around the Sun, the general relativity cannot give the solution that is exactly equal to the experimental value, while the method presented in this paper can do so.

It should be noted that, for variation principle Eq.(15), if there is an exact solution, then its right side can be equal to 0, here the variational principle Eq.(15) is exactly equivalent to $F_i = 0$ and $S_i = 0$ (see example 1 and example 3). If there is only an approximate solution, the right side of variational principles Eq.(15) can only be approximately equal to 0, at this moment we can apply the appropriate optimization method to seek the best approximate solution, and the effect of the solution can be judged according to the extent that the value of Π is close to 0 (see example 2).

3 Other "partial and temporary unified theory so far", especially "partial and temporary unified theory of natural science so far"

To extend the above mentioned method, we can get various "partial and temporary unified theory so far".

For unified dealing with the problems of four fundamental interactions, applying least square method, "partial and temporary unified theory of four fundamental interactions so far" can be expressed in the following form of "partial and temporary unified variational

principle of four fundamental interactions so far"

$$\Pi_{G.E.S.W}=\sum_{1}^{n}W_i\int_{\Omega_i}F_i^2d\Omega_i+\sum_{1}^{m}W_j'S_j^2=\min_0 \qquad (18)$$

where: the subscript G.E.S.W denotes that the suitable scope is the four fundamental interactions, all of the equations $F_i=0$ denote so far discovered (derived) all of the equations related to four fundamental interactions, all of the equations $S_i=0$ denote so far discovered (derived) all of the solitary equations related to four fundamental interactions, and W_i and W_j' are suitable positive weighted constants.

For unified dealing with the problems of natural science, applying least square method, "partial and temporary unified theory of natural science so far" can be expressed in the following form of "partial and temporary unified variational principle of natural science so far"

$$\Pi_{NATURE}=\sum_{1}^{n}W_i\int_{\Omega_i}F_i^2d\Omega_i+\sum_{1}^{m}W_j'S_j^2=\min_0 \qquad (19)$$

where: the subscript NATURE denotes that the suitable scope is all of the problems of natural science, all of the equations $F_i=0$ denote so far discovered (derived) all of the equations related to natural science, all of the equations $S_i=0$ denote so far discovered (derived) all of the solitary equations related to natural science, and W_i and W_j' are suitable positive weighted constants.

It should be noted that, in variational principle (19), all equations are combined with the irregular manner, referring to documents structure of public library (here it means that in public library all books and literatures can be divided into several subsystems according to different subjects or different authors), "partial and temporary unified theory of natural science so far" can also be written as the following rugular combination.

$$\Pi_{NATURE}=\sum_{1}^{n}W_i\Pi_i=\min \qquad (19')$$

where: the subscript NATURE denotes that the suitable scope is all of the problems of natural science; Π_i denote all subsystems according to different subjects or different authors; for example: $\Pi_1=\min_0$ may be "partial and temporary unified theory of mathematics so far", $\Pi_2=\min_0$ may be "partial and temporary unified theory of physics so far", and the like; or: $\Pi_1=\min_0$ may be "unified theory established by Newton's

various theories", $\Pi_2 = \min_0$ may be "unified theory established by Einstein's various theories", and the like; and W_i are suitable positive weighted constants.

In this way, the theory of everything to express all of natural laws, described by Hawking that a single equation could be written on a T-shirt, is partially and temporarily realized in the form of "partial and temporary unified variational principle of natural science so far".

As already noted, for "partial and temporary unified theory so far" and the corresponding "partial and temporary unified variational principle so far", the including phenomenon and coexisting phenomenon are allowed. Here we would like to point out that, besides the including process and coexisting process, the simplifying process is also allowed. For example, the first simplifying result of "partial and temporary unified theory of natural science so far" is "theory of conservation of energy", it can be expressed in the following form of "first simplifying variational principle for partial and temporary unified theory of natural science so far" (it is shorted as "variational principle of conservation of energy").

$$\Pi_{\text{NATURE}}^{\text{SIMPLE–1}} = \int_{t_1}^{t_2} (W(t)/W(0)-1)^2 dt = \min_0 \qquad (20)$$

This "variational principle of conservation of energy" can be applied for unified dealing with many problems in physics, mechanics, astronomy, biology, engineering, and even many issues in social science. For example, in reference [7], based on "theory of conservation of energy", for some cases we derived Newton's second law, the law of universal gravitation, and the like.

Further topics are finding more simplifying processes (simplifying variational principles) and their combinations. These will make "partial and temporary unified theory of natural science so far" simpler, clearer, more perfect, and more practical.

4 Conclusions

"Partial and temporary unified variational principle of natural science so far" can be printed on a T-shirt; and in future, its contained expressions can also be increased or decreased constantly based on the actual situations.

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Properties and Dimensions of Space and Time

Abstract: Based on materialist dialectics, both`time and space have the duality, namely absoluteness and relativity. If absolute time and absolute space cannot exist, then relative time and relative space cannot exist too; vice versa. However, they aren't equal. Absolute time and absolute space are more important, because they are the reference systems of relative time and relative space respectively. In addition, the absolute space is flat, while the relative space may be flat also may be curving. As for the dimensions of time and space, it is an extremely complicated question, we need to discuss the complicated time and the complicated space. The absolute space is three-dimensional, the absolute time is one-dimensional that is formed by the three-dimensional absolute time. For the relative space, it may have the multi-dimensional space, fractal dimensional space, plural dimensional space, variable dimensional space. For the relative time, it may have the multi-dimensional time, fractal dimensional time, plural dimensional time, variable dimensional time too, they are corresponding to the relative spaces. In other words, the relationship between space and time is the one by one corresponding relations. It is different to the general viewpoint that space is three-dimensional and time is one-dimensional, according to the viewpoints of self-similarity and similarity of fractal theory, three-dimensional time is derived. With the Lorentz transformation of Relativity, this paper presents the special form of three-dimensional time for a special case, which is also written as the form of variable dimension fractal. The examples given in this paper show that to establish the frames of multi-dimensional time, multi-dimensional space and the like, not only are possible but also necessary in some cases.

Key words: Absolute time, relative time, absolute space, relative space, fractal theory, variable dimension fractal, complicated time, complicated space

Introduction

The development of the theory of time and space has walked through a long and arduous road. Originally Newton established the theory of absolute space and absolute

time. This viewpoint considered that space is a rigid frame, and time is glided uniformly. In addition, time and space are not subjected to the influence of any physical process. Later on, the concept of four-dimensional space-time continual region was established in the theory of relativity. Namely, any physical event corresponds to four digits: three of which represents the location of an event, another one represents the time of the event. Einstein thought that the overall of a large number events constitute a four-dimensional space-time continual region, the properties of space and time are related to the motions of objects, and containing the meaning that space and time are no longer absolute and they are independent each other. With the development of quantum theory, we can find another viewpoint that time and space are a kind of order between things.

Although the space-time theory is developing continuously, one viewpoint has not been changed, namely in general, space is three-dimensional, and time is one-dimensional.

Similar to the viewpoint of time is one-dimensional, Euclid's fifth postulate is as follows: through a point outside a straight line, there is only one line to parallel it. As is well known, the viewpoint that there is only one parallel line has been broken by non-Euclidean geometry. In that case, whether or not the viewpoint that time is one-dimensional should be broken?

As early as 1982, Zhang Shu-run discussed the seven-dimensional space-time in the journal of Potential Science, and proposed that time is four-dimensional. While the author proposed the viewpoints of three-dimensional time and multi-dimensional time in September 2002. On this basis we can also discuss fractal-dimensional time, plural-dimensional time and variable-dimensional time.

The dimensions of space also need to be reconsidered.

According to this situation, this paper presents the concepts of complicated time and complicated space, and the related issues are also discussed.

1 Absoluteness and relativity of time and space

According to the materialist dialectics, both`time and space have the duality, namely absoluteness and relativity. Relative time and relative space are conditional, temporary and limited; and absolute time and absolute space are unconditional, eternal, and infinite. Absoluteness and relativity are interdependent, both are necessary. Do not have absolute time and absolute space, relative time and relative space cannot exist, and vice versa. Do not have absolute time and absolute space, relative time and relative space cannot be defined. Now, if someone said that something only has the advantages without the disadvantages, no one will believe it. The reason that relative time and relative space cannot exist independently, is the same that something cannot have the advantages only without the disadvantages.

Similar to that absolute truth is existed in relative truths, absolute time and absolute space are only exist in relative times and relative spaces.

On the other hand, for absolute time and relative time, and for absolute space and relative space, their statuses are not equal. If absolute time and relative time are seen as the contradictory two aspects, so do absolute space and relative space, then for the contradictory two aspects, one aspect is main, and another aspect is non-main. Therefore

we should say that absolute time and absolute space are more important, because they are the reference system of relative time and relative space. Of course, in another sense, we can also considered that relative time and relative space are more important, because the main aspect and non-main aspect may be interchangeable under certain conditions.

There is a viewpoint to nagate absolute time and absolute space, that is absolute time and absolute space cannot exist in the real world.

While，this viewpoint is clearly untenable in philosophy. As we already pointed out that, absolute time and absolute space can exist in relative times and relative spaces respectively.

In addition, what's the meaning of existance? In a sense, absolute time and absolute space do not exist in the real world. But in an abstract world, namely for theoretical thinking in mathematics and physics, absolute time and absolute space can exist. In other words, things that do not exist in the real world do not mean that they cannot be defined, and cannot be applied.

For example, mathematical point cannot exist in the real world. But the concept of point can be defined mathematically, and it has a very wide range of applications. Another example is that, as discussing the celestial movements, the Earth and the Sun are becoming "point". It is convenient and the results are in line with the actual situations.

Einstein believed that it is not necessary to introduce a special "absolutely stationary space", but for the "static system" introduced by himself, in a sense, it is equivalent to the "absolutely stationary space".

How to determine the absolute space and absolute time?

The answer is as follows: according to different problems and different conditions, we can define or determine the absolute time and absolute space. For example, a certain point in the deep universe can be defined as the origin of absolute space, and its three axes can also be defined. Then place the world's most accurate atomic clock at the origin of the absolute space, thus the atomic clock can be used to measure the absolute time.

Of course, this manner will produce errors. But these errors can also be revised. For example, at present the timing system is accurate enough, but from time to time, it is also to be revised. Such as several years ago, according the related authorities of the world, that year's last-minute was 61 seconds instead of 60 seconds. This is the example to revise the timing system's errors.

As to the problem of changing other coordinate system's space and time into absolute space and absolute time, this is a topic that needs further study. However, to compare with the definition of absolute space's origin, this should be relatively easy to solve. At present, we can use the formulas of the theory of relativity, until these formulas will be proved that they lead to the wrong results.

Now we discuss the space and time conversion problems between the different coordinate systems. For example, the conversion problems between a spaceship, the Earth and the Moon.

The space conversion problem has been solved in mathematics, here we will no longer discuss it.

As discussing the time conversion problem, two cases of absolute time and relative time should be considered respectively.

For absolute time, the absolute time in a spaceship is the same as the absolute time on the Earth and on the Moon, namely there is only one absolute time; as in Newton's view, absolute, true, and mathematical time, by its nature, it is independent of all external objects.

For relative time, in general the relative time in a spaceship is not the same as that on the Earth and on the Moon. According to the viewpoint of theory of relativity, for one person in a spaceship and for another person on the Earth, both of them will consider that the other side's relative time is slower than that of himself, and the two slow degrees are the same; but for third side, for example from the viewpoint of the person on the Moon, the relative times in a spaceship and on the Earth, are all slower than that of the Moon, while the slow degrees are not the same. As to the specific conversion formulas, we can also use the ones given by theory of relativity temporarily.

The reason for that we can only use the formulas given by theory of relativity temporarily, is as follows.

Firstly we consider that whether or not the slow degree of time in a spaceship can be calculated with theory of relativity.

The answer is that it is impossible in some cases.

On this point, we can refer to the original version of Einstein. In the famous paper entitled "On the Electrodynamics of Moving Bodies" that presented the special relativity, only for the case of the route of spaceship is the arbitrary polyline, the calculation method for slow down time of a moving clock is given. Then Einstein assumed that the calculation method is still valid for the route is a continuous curve. In fact, this assumption may be incorrect for some continuous curves. The reason for this is that, the special relativity including Lorentz transformation is based on the principle of invariance of light speed and the principle of relativity, it does not take into account the cases of various continuous curves, so this calculation method is not guaranteed that it is correct for any continuous curve.

There are many more complex issues, such as the special twin paradox that two brothers' states of motion are quite same. If the elder brother and the younger brother all ride their respective high speed airships, facing the completely opposite directions to navigate from the identical time and the identical site on the Earth with the same speed along a straight line, after a long period they begin to decelerate simultaneously until static, then they turn around to navigate again along the same straight line with the manner of front to front, finally simultaneously return to the starting point. From the younger brother's viewpoint that, according to the theory of relativity, the elder brother should be much younger than the younger brother; Similarly, from the elder brother's viewpoint that, according to the theory of relativity, the younger brother should be much younger than the elder brother. Who is much younger to the end? Moreover, we can also suppose that from the beginning to the end, the two brothers are running along the complicated spiral curves. How to solve these problems with the theory of relativity? Perhaps some scholars propose that this problem can be solved by taking the Earth as the reference system and using the theory of relativity. However, the Earth moves around the Sun, and the Sun moves around the Milky Way, considering these questions will cause the problems become extremely complex, or even impossible to be solved. Therefore, in order to solve these problems,

finally we have to establish the theory beyond relativity that is based on absolute space and absolute time.

In addition, for many other properties of time and space, they must be considered with absoluteness and relativity respectively. For example, space is flat, or curving? Our view is as follows: absolute space is flat, while the relative space can be flat or curving. For these issues, we will discuss them in another paper.

2 Complicated time and complicated space

As discussing the dimensions of time and space, we must face a number of very complex situations, hence we need to introduce the concepts of complicated time and complicated space. In other words, for different situations, the dimensions of time and space are different.

In general, the dimension of time and the dimension of space have the corresponding relationship. This means that the dimension of time corresponds to the dimension of space.

Firstly we discuss the dimensions of absolute space and absolute time.

Absolute space is three-dimensional, this does not appear to be argued. Corresponding to the three-dimensional absolute space, there should be three-dimensional absolute time. However, absolute space is a rigid framework, the times for three coordinates are the same, so the absolute time is one-dimensional.

While dimensions of relative time and relative space are extremely complex.

If the description of moving body requires the use of three-dimensional space, and relative time is related to motion, so that in this case the relative time is three-dimensional too.

However, the three-dimensional space can only be used to determine the location of point, but cannot determine the rotation of point. If we consider point rotation around the three axes, it is necessary to add three-dimensional becoming a six-dimensional space. It is important to note, this six-dimensional space has been widely used in the ship engineering, architecture, and the like. Corresponding to this six-dimensional space, the time is six-dimensional too.

In other cases, we can also discuss multi-dimensional space, fractal dimensional space, plural dimensional space, variable dimensional space. As well as the corresponding multi-dimensional time, fractal dimensional time, plural dimensional time, variable dimensional time. In other words, the relationships between spaces and times are one-to-one correspondence.

Some specific issues are discussed below.

3 Implications of fractal theory and three-dimensional time

Fractal theory is introducted in 1967, although only a few decades passed, but it has been applied successfully in some areas, it is used to reveal the organizational structure deeply hidden in complex phenomena. Many scientists predict that, in the 21st century, whether in natural science or in social sciences, fractal methods will achieve significant results. The characteristic of fractal theory is introduced the concept of fractal dimension. In traditional geometry, dimension is a integer, for example, point is

zero-dimensional, line is one-dimensional, plane is two-dimensional, and so on. While in fractal method, breaking the constraint of integer, the fractal dimension D can be taken as non-integer, such as the coastline fractal dimension D can be taken as 1.02,1.25 and so on. In the original fractal theory, the fractal dimension is constant, this fractal distribution is a straight line on a log-log coordinate.

One of the characteristics of organized structures revealed by fractal method is self-similarity. For example, the various photos, including the mountain photo taken from the plane, the photo of the rubble, and microscope photo of rough rocky surface, are very similar, sometimes we cannot distinguish them. As another example, putting together the original coastline photo, its enlarged 1 time photo, twice times photo, 5 times photo and the like, from the features of their twists and turns, they are also unable to be distinguished. In addition, for the same coastline, if using the rulers of 1m, 0.5m, 0.2m, 0.1m and the like to measure the length, the measurement results are not the same, the shorter the ruler, the longer the result. These self-similar phenomena, can be found in many areas, so they can be unified processing by using the fractal method.

It should be noted that, the conclusion concerning "self-similarity" in fractal theory can also produce the conclusion of "similarity". "Self-similarity" refers to the part and the global are similar. Since each part is similar to the global, then any part is similar to another part.

According to the revelation on "similarity between part and part" from fractal theory, if taking time and space as a global, taking time and space as two parts, then time and space should be similar. In that case, corresponding to the space is three-dimensional, the time should be three-dimensional too. Corresponding to the space of other dimensions, time should also be other dimensions.

4 Formulas of three-dimensional time in a special case

Selecting two different reference frames S and S', their coordinates are x, y, z, and x', y', z'. At the beginning, S and S' are coincident, in frame S there is a line r through its origin O, the angles between r and x, y, z are α, β, γ respectively. In frame S' the corresponding line is r'. Then the origin O' of S' is moving along the line r with constant speed V, and x', y', z' are always parellel to x, y, z. Supposing that in frame S, the times along x, y, z and r directions are t_x, t_y, t_z and t_r respectively, and in frame S', the times along x', y', z' and r' directions are $t'_{x'}$, $t'_{y'}$, $t'_{z'}$ and $t'_{r'}$ respectively.

Assuming that the reference frame S is absolutely static, then we have

$$t_x = t_y = t_z = t_r = t \qquad (1)$$

According to the Lorentz transformation in the theory of relativity, if frame S' is moving along x direction, it gives the time transformation formula as follows

$$t' = \frac{t - (V / c^2)x}{(1 - V^2 / c^2)^{1/2}} \qquad (2)$$

Accordingly, if frame S' is moving along r direction, it gives the time transformation formula along r' direction as follows

$$t'_{r'} = \frac{t - (V / c^2)r}{(1 - V^2 / c^2)^{1/2}} \qquad (3)$$

Projecting it to x', y', z' directions respectively, in frame S' it gives the times of $t'_{x'}$, $t'_{y'}$, $t'_{z'}$ along x', y', z' directions as follows

$$t'_{x'} = t'_{r'} \cos\alpha \qquad (4)$$

$$t'_{y'} = t'_{r'} \cos\beta \qquad (5)$$

$$t'_{z'} = t'_{r'} \cos\gamma \qquad (6)$$

At this point, in frame S' we derive the formulas of three-dimensional time in a special case.

5 Variable dimension fractal formulas of three-dimensional time

Fractal distribution can be defined as follows[1]

$$N = \frac{C}{r^D} \qquad (7)$$

where: r is the characteristic scale, such as length and the like; N is a quantity related to r, such as time, temperature, force and the like; C is an undetermined constant; D is the fractal dimension.

In the present application of fractal method, D is a constant, this kind of fractal is known as constant dimension fractal. It is a straight line on a log-log coordinate. But for non-linear functional relationship, the constant dimension fractal cannot be used. In order to overcome this difficulty, in reference [2]~[4] we introduce the concept of variable dimension fractal and fractal dimension D is the function of characteristic scale r.

The expression of D is as follows

$$D = g(r) \qquad (8)$$

Now we illustrate that any functional relationship N = f(r) can be converted into the form of variable dimension fractal, for this purpose it gives

$$f(r) = \frac{C}{r^D} \qquad (9)$$

The value of D can be solved as follows

$$D = \frac{\ln C - \ln f(r)}{\ln r} \qquad (10)$$

Namely the function f(r) is converted into the form of variable dimension fractal.

For Eq.(3) to Eq.(6), only Eq.(3) is required to be converted into the form of variable dimension fractal. For the sake of convenience, supposing C=1, then we have

$$t'_{r'} = \frac{1}{r^D} \qquad (11)$$

From Eq.(3) and Eq.(11), we can get

$$D = -\frac{\ln K}{\ln r} \qquad (12)$$

where: $K = \frac{t - (V/c^2)r}{(1 - V^2/c^2)^{1/2}}$

It should be noted that, here the time is still three-dimensional, but it is rewritten into the form of variable dimension fractal.

6 Multi-dimensional time and the related examples

In reference [5], in order to overcome the difficulties encountered by certain issues, Stephen Hawking introduced "imaginary time", thus the "imaginary time" and the “real time” can be seen as an example of multi-dimensional (two-dimensional) time.

Now we present an example that the multi-dimensional time must be applied.

Firstly assuming that within a certain period, one stock’s price P can be written as a function of time

$$P=F(t) \tag{13}$$

Secondly assuming that the concrete strength Q_A located at position A can be written as a function of time

$$Q_A=G_A(t) \tag{14}$$

Thirdly assuming that the concrete strength Q_B located at position B can be written as another function of time

$$Q_B=G_B(t) \tag{15}$$

Similarly, more functions can be defined.

From Eq.(14) we can reach the value of t as follows

$$t=H_A(Q_A) \tag{16}$$

Substituting it into Eq.(13), we can get

$$P=F(H_A(Q_A)) \tag{17}$$

Namely we get a ridiculous conclusion: one stock’s price P is a function of the concrete strength Q_A located at position A.

Of course, if this problem is procesing by the human brain, this conclusion cannot be reached. But procesing by the computer, this conclusion may be reached. In order to fundamentally prevent such errors, we must use different time coordinates. Such as the stock time coordinate can be recorded as t_0, at position A the time coordinate can be recorded as t_A, and so on. And we stipulate that the different time coordinates cannot be interchanged. If multidi-mensional time is not introduced in this example, we will have not the reason to make the non-interchangeable provisions.

Finally, it is worth to mention such a historical fact: facing many people’s blame, the founder of non-Euclidean geometry said, the viewpoint is correct logicaly that through a

point outside a straight line, there are more than one lines to parallel it.

Similarly, the concepts of multidi-mensional time, fractal dimensional time, plural dimensional time, and variable dimension fractal time, are all correct logicaly.

Based on the same reason, the various dimensions of space can also be introduced, but we do not intend to discuss them in this paper.

7 Fractal dimensional time, plural dimensional time, and variable dimensional time

From the previous discussions we can find that the dimensions of time and space are related to the problems we discussed and the methods we applied.

In references [6-8], fractal dimension, plural dimension fractal, and variable dimension fractal have been used to deal with some problems in physics and the like.

By using fractal dimension, plural dimension fractal and variable dimension fractal, and the like to discuss the problems of time, we can reach fractal dimensional time, plural dimensional time, and variable dimensional time.

Firstly let us look back on the application of general fractal formula Eq. (7) to deal with coastline length, and reach the dimension of coastline. For the same coastline, if using the rulers of 1m, 0.5m, 0.2m, 0.1m, and the like to measure the length, the measurement results are not the same. Drawing these results on a log-log coordinate, if the data points are located at the same straight line, then the slope of the straight line is the dimension of the coastline. If the data points are not located at the same line, we can use the least squares method and the like to calculate the slope of the fitting straight line, and take it as the dimension of the coastline. If the coastline is a straight line, its dimension is equal to the integer 1; if the coastline is a complex curve, its dimension D may be a fraction, such as 1.02,1.25, and so on.

Similar methods can be used to find the dimensions of time in some cases.

Assuming that for a certain route, several counters in the spaceship will be used to measure the times. In advance, these counters were calibrated on the Earth, thus the counters' intervals of "tick-tock" are 1s, 0.5s, 0.2s, and the like respectively. For each counter, measuring result should be drawing on a log-log coordinate, if all the data points given by the different counters located at the same straight line, the slope of the straight line is the dimension of time. If all the data points are not located at the same straight line, we can use the least squares method and the like to calculate the dimension of time. If the spaceship's route is a straight line and its speed is lower, the dimension of time is equal to the integer 1, and the time is one-dimensional, thus the result is consistent with the traditional viewpoint; if the route is a complex curve and the speed is very fast and changable, then the dimension may be a fraction, and the example for fractal dimensional time is given.

In addition, after the above mentioned data are drawing on a log-log coordinate, if the distribution of these data is the form of a curve, instead of close to a straight line, thus we cannot apply least square method and the like to fit these data with a straight line. In this case, the variable dimension fractal method should be used to fit these data with a curve, namely the fractal dimension of time is variable, and the variable dimensional time is reached.

Moreover, supposing that we consider two spaceships simultaneously, these two

spaceships' routes are two complex curves and their speeds are very fast and changable, and these two measuring results with counters are drawing on two log-log coordinates respectively. If we want to process these two measuring results with a unified way, then the plural dimension fractal method should be used, namely the dimension of time is a plurality, and the plural dimensional time is reached.

7 Conclusions

According to the viewpoint of materialist dialectics, we can discuss the absoluteness and relativity of time and space. As studying the dimensions of time and space, we can introduce the concepts of complicated time and complicated space. The absolute space is three-dimensional, and the absolute time is one-dimensional. The relative spaces may be multi-dimensional, fractal dimensional, plural dimensional, and variable dimensional. The relative times may be corresponding to the relative spaces, and they may also be multi-dimensional, fractal dimensional, plural dimensional, and variable dimensional. The above mentioned results are correct logically and supported by many examples.

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Chapter 4: Solving Problems of Advance of Mercury's Perihelion and Deflection of Photon Around the Sun with New Newton's Formula of Gravity

Solving Problems of Advance of Mercury's Perihelion and Deflection of Photon Around the Sun with New Newton's

Formula of Gravity

Abstract: According to the new Newton's formula of gravity (the original law of gravity plus a correction term), i.e., improved Newton's formula of gravity, applying the methods of classical mechanics to solve the problem of advance of Mercury's perihelion and the problem of deflection of photon around the Sun respectively, and the results are the same as given by general relativity. Pointing out that the further topic is based on deriving original law of gravity and original Newton's second law with law of conservation of energy to derive the new Newton's formula of gravity (the improved Newton's formula of gravity) with law of conservation of energy. To realize the purpose that partially replacing relativity and solving some problems that cannot be solved by relativity with the methods of classical mechanics.

Key words: Law of gravity, new Newton's formula of gravity (improved Newton's formula of gravity), advance of Mercury's perihelion, deflection of photon around the Sun, law of conservation of energy

Introduction

In references [1, 2], the new Newton's formula of gravity (the original law of gravity plus a correction term), i.e., the improved Newton's formula of gravity, was presented; but it did not present the detailed process to solve the problem of advance of Mercury's perihelion and the problem of deflection of photon around the Sun respectively with the methods of classical mechanics. While, in this paper the detailed process will be given (the results are the same as given by general relativity).

The improved Newton's formula of gravity is as follows

$$F = -\frac{GMm}{r^2} - \frac{3G^2M^2mp}{c^2r^4} \qquad (1)$$

where: G is gravitational constant, M and m are the masses of the two objects, r is the distance between the two objects, c is the speed of light, p is the half normal chord for the object with mass m moving around the object with mass M along a curve, and the value of p is given by: $p = a(1\text{-}e^2)$ (for ellipse), $p = a(e^2\text{-}1)$ (for hyperbola), $p = y^2/2x$ (for parabola).

1 Solving the problem of advance of Mercury's perihelion with new Newton's formula of gravity

In classical mechanics, acted by the central force, the orbit differential equation (Binet's formula) reads

$$h^2u^2(u''+u) = -\frac{F}{m} \qquad (2)$$

where: $u = \frac{1}{r}$.

As deriving Eq.(1), it already gives

$$h^2 = GMp \qquad (3)$$

Substituting Eq.(1) and Eq.(3) into Eq.(2), we have the following equation of planet's movement around the Sun

$$u''+u=\frac{1}{p}+\frac{3GMu^2}{c^2} \qquad (4)$$

For ellipse, $p=a(e^2-1)$, thus the approximate solution for Eq.(4) is as follows

$$u\approx\frac{GM}{a(1-e^2)c^2}[1+e\cos(-\frac{3GM}{a(1-e^2)c^2})\varphi] \qquad (5)$$

Hence, the value of ε for advance of planetary perihelion for one circuit is as follows

$$\varepsilon=\frac{24\pi^3a^2}{T^2c^2(1-e^2)} \qquad (6)$$

where: T, a, and e are orbital period, semi-major axis and eccentricity respectively.

Obviously, this result is the same as given by general relativity.

In addition, according to Eq.(1), for problem of planetary motion around the Sun, the improved Newton's formula of gravity reads

$$F=-\frac{GMm}{r^2}-\frac{3G^2M^2ma(1-e^2)}{c^2r^4}$$

2 Solving the problem of deflection of photon around the Sun with new Newton's formula of gravity

As solving this problem by using the improved formula of gravity, the method to be used is the same as presented in references [3], in which the original law of gravity was used.

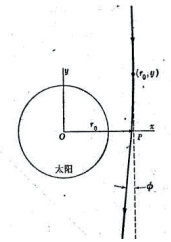

Fig. 1 Deflection of photon around the Sun

Supposing that m represents the mass of photon, for the reason that it will be eliminated, so it is not necessary to give its value. As shown in Fig.1, r_0 represents the nearest distance between the photon and the center of the Sun, for the reason that the deflection is very small, so actually the value of r_0 is the same as the photon is not

deflected. When the photon is located at （r_0， y）(the value of y is measured from point P in Fig.1), the force acted on photon is as follows

$$F_x = \frac{Fr_0}{(r_0^2 + y^2)^{1/2}} \qquad (7)$$

where： $F = -\frac{GMm}{r_0^2 + y^2} - \frac{3G^2M^2mp}{c^2(r_0^2 + y^2)^2}$

Because

$$mv_x = \int F_x dt = \int F_x \frac{dy}{v_y} \approx \frac{1}{c}\int F_x dy$$

Therefore

$$v_x \approx -\frac{2GMr_0}{c}\int_0^\infty \frac{dy}{(r_0^2 + y^2)^{3/2}} - \frac{6G^2M^2pr_0}{c^3}\int_0^\infty \frac{dy}{(r_0^2 + y^2)^{5/2}}$$

After calculating, it gives

$$v_x \approx -\frac{2GM}{cr_0} - \frac{4G^2M^2p}{c^3r_0^3} \qquad (8)$$

Hence, the deflection angle ϕ is as follows

$$\phi \approx tg\phi \approx \frac{|v_x|}{c} = \frac{2GM}{c^2r_0} + \frac{4G^2M^2p}{c^4r_0^3} \qquad (9)$$

While, the value of ϕ should be determined by iteration method.

Before determining the value of ϕ, firstly we will validate that the value of the second term in Eq.(9) is equal to the value of the first term, that means that the deflection given by the second term in Eq.(9) is equal to that given by the first term.

As solving problem of deflection of photon around the Sun with general relativity, the photon's orbit is a hyperbola, and its equation is as follows

$$u = u_0 \cos\varphi + \frac{GMu_0^2(1 + \sin^2\varphi)}{c^2} \qquad (10)$$

where： $u_0 = \frac{1}{r_0}$

Hence, the reciprocal of the half normal chord p is as follows

$$\frac{1}{p} = u\big|_{\varphi=\pi/2} = \frac{2GM}{c^2r_0^2} \qquad (11)$$

Substituting this value of the half normal chord p into Eq.（9）, it gives

$$\phi = \frac{4GM}{c^2 r_0} = \frac{4GM}{c^2 R_s} \qquad (12)$$

where: R_s is the radius of the Sun.

Thus, the value of the second term in Eq.(9) is really equal to the value of the first term.

Now we determine the value of ϕ in Eq.(9) by iteration method.

Suppose

$$\phi = \frac{K G M}{c^2 r_0} \qquad (13)$$

In order to apply iteration method, the relationship between ϕ and p should be given.

Considering two straight lines, the first one is $x = r_0$, the second one is passing through the origin O and the first quadrant, and it makes an angle of $\phi/2$ with the positive direction of Y axis; the value of the half normal chord p is equal to the distance between the origin O and the intersection of the two straight lines. Supposing that the intersection of the two straight lines is the point P_1 (it is not shown in Fig.1), then its coordinates are $(r_0, \sqrt{p^2 - r_0^2})$.

From the triangle formed by the three points of origin O, P, and P_1, it gives

$$\frac{r_0}{p} = \sin\frac{\phi}{2} \approx \frac{\phi}{2}$$

$$p = \frac{2r_0}{\phi} \qquad (14)$$

Now, considering the result of the value of ϕ given by the original law of gravity, it gives

$$K_0 = 2$$

Here, the deflection angle is as follows

$$\phi_0 = \frac{2GM}{c^2 r_0}$$

From Eq.（14）, its corresponding half normal chord p_0 is as follows

$$p_0 = \frac{c^2 r_0^2}{GM}$$

Substituting the value of p_0 into Eq.（9）, it gives

$$\phi_1 = \frac{6GM}{c^2 r_0}$$

Namely

$$K_1 = 6$$

Similarly, the values of K_2, K_3, and the like are as follows: 3.3333, 4.4000, 3.8182, 4.0952, 3.9535, 4.0234, 3.9883, 4.0059, 3.9971, 4.0015, 3.9993, 4.0004, 3.9998, 4.0001, 4.0000, 4.0000; finally it gives

$$K = 4$$

This result is also the same as given by general relativity.

According to Eq.(1), for problem of deflection of photon around the Sun, the improved Newton's formula of gravity reads

$$F = -\frac{GMm}{r^2} - \frac{1.5GMm_0^2}{r^4}$$

where: r_0 is the shortest distance between the photon and the Sun, if the light and the Sun is tangent, it is equal to the radius of the Sun.

The interesting fact is that, for this problem, the maximum gravitational force given by the improved Newton's formula of gravity is 2.5 times of that given by the original Newton's law of gravity.

3 Further topic

In references [4-6], the original law of gravity and the original Newton's second law have been derived with law of conservation of energy, based on this, the further topic is to derive the new Newton's formula of gravity (the improved Newton's formula of gravity), i.e., Eq.(1), with law of conservation of energy. And, finally, to realize the purpose that partially replacing relativity and solving some problems that cannot be solved by relativity with the methods of classical mechanics.

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Problems Relativity cannot Solve or Induce Wrong Results

Abstract: Based on author's published papers, summarizing some problems that special and general relativity cannot solve or induce wrong results, such as: special twin paradox that two brothers' states of motion are quite same, contradictions between relativity and principle of conservation of energy, and the like. The two main shortcomings of relativity are as follows: firstly, applying mathematical principle (rather than physical principle) as the main principle to solve physics problems; secondly, as establishing relativity, the principle of conservation of energy is not considered. Referring to "partial and temporary unified theory of natural science so far" including all the equations of natural science so far, the related formulas and equations of relativity can be improved and restricted (or constrained) by principle of conservation of energy, and thus these formulas and equations can satisfy the principle of conservation of energy.
Key words: Relativity, special relativity, general relativity, shortcoming, principle of conservation of energy, partial and temporary unified theory of natural science so far

1 Introduction

Since the year of 1920, theory of relativity has been held on a altar. After entering the 21st century, the situation already changed in some cases, Einstein and theory of relativity have started to go down from the altar. An increasing number of scholars point out the defects and shortcomings, even wrong results of relativity.

Based on the papers and the like published by the author, this paper summarizes some problems that special and general relativity cannot solve or produce wrong results

2 Problems that special and general relativity cannot solve or induce wrong results

（1）Special twin paradox that two brothers' states of motion are quite same

As well-known, the phenomenon of "clocks look slower" causes the twin paradox. According to theory of relativity, supposing that there are a pair of twins, the younger

brother keeps on the Earth, the elder brother roams through the outer space as a astronaut. As the elder brother returns to the Earth, he will be much younger than his younger brother. The twin paradox means: Because the movement is relative, we also may think that the younger brother is carrying on the space navigation, therefore the younger brother should be much younger than the elder brother. Such two conclusions are mutually conflict.

There are many explanations given by theory of relativity to this twin paradox (some of them even use general theory of relativity to carry on the complex computation), but their basic starting point is as follows: Two brothers' states of motion are different. Thereupon we may make another special twin paradox that two brothers' states of motion are quite same. If the younger brother doesn't keep on the Earth, but the elder brother and the younger brother all ride their respective high speed airships, facing the completely opposite directions to navigate from the identical time and the identical site with the same speed along a straight line, after a long period they begin to decelerate simultaneously until static, then they turn around to navigate again along the same straight line with the manner of front to front, finally simultaneously return to the starting point. From the younger brother's viewpoint that, according to the theory of relativity, the elder brother should be much younger than the younger brother; Similarly, from the elder brother's viewpoint that, according to the theory of relativity, the younger brother should be much younger than the elder brother. Who is much younger to the end?

With the theory of relativity, how to explain this special twin paradox that two brothers' states of motion are quite same?

This example is taken from reference [1].

（2）The question caused by inertia mass and gravitational mass are equivalent

For a heavenly body moves around the sun, if the sun does not radiate the heat energy, then the principle of equivalence may be correct. But, the sun radiates the heat energy. As the object temperatures are different, then its masses are also different, therefore, the inertia mass under one kind of temperature is not the same as the gravitational mass under another kind of temperature.

Thus it can be seen that, the principle of equivalence at least should be revised as follows: Under the same temperature the inertial mass and the gravitational mass are equivalent.

But another question will be coming, the masses of some objects also could be changed in the electromagnetic field, thereupon the principle of equivalence should be revised again as follows: Under the same temperature and the same electromagnetic field situation the inertial mass and the gravitational mass are equivalent.

To this analogizes, when will such revisions be finished?

This example is also taken from reference [1].

（3）The problem caused by principle of constant speed of light

As well-known, principle of constant speed of light is one of the two basic principles of special relativity. According to this principle, light travels in straight line in vacuum at a speed of c=300,000 km/s.

Now we explain that principle of constant speed of light is wrong, and as light traveling in vacuum, the direction and the value of its speed are all variable. The changing range of its direction is between 0º to 180º, and the changing range of its value is between 0 to 2c (c=300,000 km/s). As for the speeds of other matters (bodies) and particles, the author agrees with Prof. Smarandache's viewpoint that there is not the upper limit of speed in the universe. The hypothesis that there is the upper limit of speed will be contradicted to the principle of conservation of energy.

Because the speed of light is a vector, therefore as discussing that whether or not the speed of light is variable, we should consider two aspects of the direction and the value.

Now we illustrate the speed of light is variable from two aspects of the direction and the value.

Firstly, Einstein also recognized that the speed of light is variable in direction.

Einstein pointed out that, one of the meaningful inferences and conclusions of the general principle of relativity is: commonly light travels along a curve in gravitational field. Due to the bending of light can only be happened as the speed of light is changing along with the changing of the position, so we have to make this conclusion: the effectiveness of special principle of relativity cannot be considered as endless, the result of special principle of relativity is tenable only in the case that we cannot consider the influence of gravitational field to the phenomenon (such as the light phenomenon).

Einstein said here very clearly that the direction of speed of light is variable in gravitational field, therefore the speed of light is variable.

Immediately a question that Einstein might not consider is appeared: will light be bending only in gravitational field?

But this is not correct. In June, 2007, an article published in science and technology daily and other media reported that, a new material making light to be bended can be applied to produce the invisibility cloak. Although Einstein's research work did not demonstrate that light can be bended in this way, the scientists of Duke University, United States announced a few weeks ago that, they unveiled the mystery of "invisibility cloak", and succeeded in covering an area of 5 square inches of object to avoid for the microwave detection. This material can change the direction of microwave so that it bypasses the object. The researchers of Duke University said that they hope to develop other types of invisibility cloak that can even survive the visible light.

Another very obvious fact is that, when the light is projected to a mirror with an angle that is not equal to zero, after reflecting its direction will be changed. In this case, the changing range of its direction is between 0º to 180º.

Now we discuss the changing range of the value of speed of light.

Let us consider the two rays of light, taking a ray of light as the frame of reference to inspect the speed of another ray of light.

Since we can choose the carriage traveling at speed v on the rail as the frame of reference, it should be allowed to choose a ray of light as the frame of reference.

If taking a ray of light as the frame of reference, when the two rays of light are located on the same straight line and have the same direction (the angle between the two rays is equal to 0º), the speed of another ray of light relative to the first ray of light is equal to zero. When the two rays of light are located on the same straight line and have the opposite

directions (the angle between the two rays is equal to 180º), the speed of another ray of light relative to the first ray of light is equal to 2c (c=300,000 km/s). When the angle between the two rays of light is equal to other value, the variation range of the speed of another light relative to the first ray of light is 0 to 2c.

According to the law of composition of velocities, supposing that two rays of light are projected from a single point at the same time (the angle is equal to θ), from the front end photon of a ray of light to observe the front end photon of another ray of light, the speed of the front end photon of another light is as follows

$$V_{Photon} = 2c\sin(\theta/2) \qquad 0 \le \theta \le \pi$$

In other cases, whether or not the value of the speed of light is variable, and whether or not the changing range is still limited in the range of 0 to 2c, these questions are further topics to be discussed.

In addition, for the experimental verification of the principle of constant speed of light, we should say that, all of the experiments are very limited, and a number of factors have not been considered. For example, whether or not the speed of light is variable in the cases that the light is acted by the strong source of heat radiation and the like?

Here, we can point out the wrong results caused by Lorentz transformation.

As we have said, when the two rays of light are located on the same straight line and have the opposite directions, the speed of another ray of light relative to the first ray of light is equal to 2c. But in this case, the Lorentz transformation may give the wrong result that the speed of another ray of light relative to the first ray of light is still equal to c.

This example is taken from reference [2].

（4）The problem caused by special principle of relativity

According to the special principle of relativity, physical laws are the same in *all* inertial reference frames.

If the meaning of "same" is "completely equivalent", then the special principle of relativity has the question in the area of philosophy.

In the world people never find two completely equal leaves. Similarly, it is impossible that physical laws are the same in *all* inertial reference frames.

For any two reference frames (coordinate systems), the descriptions to some physical laws impossibly to be completely same. Regarding the different reference-bodies (or their state of motion), at least we may say, the convenient degrees to describe "the law of nature" are different. That is the reason that the rectangular coordinates and polar coordinates are more universal (or more predominant) than other coordinates.

Especially, if these physical laws refer to the quantity relations, or for the reason that some conditions are different, the descriptions for them may be completely dissimilar.

For example, for the law of sound velocity, we may say that, "On the earth's surface with air temperature is 15℃, the sound velocity is 340m/s."

But, for the airplane flying with the sound velocity, if its flight direction is consistent with the sound propagation direction, then the sound velocity is 0m/s. If its flight direction is opposite to the sound propagation direction, then the sound velocity is 680m/s.

Moreover, for the coordinate systems in vacuum state, among them the sound simply

cannot propagate, thus the sound velocity is 0m/s forever. Please note this conclusion, because we can see that this conclusion will cause the Lorentz transformation to induce the wrong result.

The readers may display their own imaginations as far as possible, to find more mistakes about the special principle of relativity.

This part is taken from reference [1].

（5）The problem caused by general principle of relativity

As for the question of general principle of relativity (the principle of general covariance), it does not need us to point out, Einstein himself already revised his original viewpoint. In other words, to withdraw a stride from his originally proposed general principle of relativity (the principle of general covariance).

Einstein pointed out that, the following statement corresponds to the fundamental idea of the general principle of relativity: *"All Gaussian coordinate systems are essentially equivalent for the formulation of the general laws of nature."*

Here, Einstein already has obviously drawn back a step, from "*All coordinate systems are essentially equivalent for the formulation of the general laws of nature*", drew back to be restricted in "all Gaussian coordinate systems" only.

As for the reason to draw back this step, we cannot find the explanation.

A logical explanation is that the general principle of relativity has encountered the trouble.

Moreover, it also has another question: Why has to draw back to "all Gaussian coordinate systems"? We cannot find the explanation also. A logical explanation is that, because the general theory of relativity used the Gaussian coordinate systems, therefore it could not draw back further.

It is difficult to understand that, Einstein already discarded the general principle of relativity, i.e., "*All coordinate systems are essentially equivalent for the formulation of the general laws of nature*" (or similar statement), but at present it still be used in many textbooks!

Here we present an example to show that *all coordinate systems are not essentially equivalent for the formulation of the general laws of nature*.

As well-known, the fractal distribution reads

$$N = \frac{C}{r^D}$$

The fractal distribution is a straight line only in the double logarithmic coordinates. Therefore, if some law of nature conforms to the fractal distribution rule, then the law that "the change of this natural phenomenon conforms to the linear rule" is only correct in the double logarithmic coordinates.

This part is taken from reference [1].

（6）General relativity cannot solve the problem of advance of planetary perihelion

Although general relativity was used to solve the problem of advance of planetary perihelion, it contains some subjective factors; one of the most critical question is that for planetary motion equation of general relativity, the non-closed and non-symmetric solution

is presented deliberately. Similarly, the closed and symmetric solution can also be presented deliberately. In this way, general relativity will be not available to deal with the problem of advance of planetary perihelion, and the new approach should be found.

From reference [3] we can see that, if considering the approximate solution including two terms only, general relativity can reach the better results as solving the problem of advance of planetary perihelion. But considering the approximate solution including more terms, whether or not general relativity can be used to deal with the problem of advance of planetary perihelion? This is a further topic needed to be studied carefully.

In reference [3], referring to the planetary elliptical motion equation given by law of gravity, the closed and symmetric approximate solution for planetary motion equation of general relativity can be taken as follows

$$u = \frac{1 + e\cos\varphi}{p} + b_0 + b_1\cos\varphi + b_2\cos 2\varphi + ...$$

Obviously, it satisfies the following symmetric condition

$$f(\varphi) = f(-\varphi)$$

If the solution for planetary motion equation of general relativity is unique, then the non-closed and non-symmetric solution including infinite terms should tend to the closed and symmetric solution (namely the value of advance of planetary perihelion should tend to be equal to 0).

In reference [4], a new explanation is presented: The advance of planetary perihelion is the combined result of two motions. The first elliptical motion creates the perihelion, and the second vortex motion of solar system creates the advance of perihelion. In the motion of planet-sun system, under the action of law of gravity, the planetary orbit is a closed ellipse, and consistent with the law of conservation of energy. Meanwhile, the planet also participates in the vortex motion of solar system taking the sun as center; the long-term trend of the vortex is the further topic, but in the short-term may be considered that due to the inertia the planetary perihelion will run circular motion in vortex and lead to the advance of perihelion, thus also without acting against the law of conservation of energy. Based on the result of general relativity, the approximate angular velocity of advance of perihelion is given; and based on accurate astronomical observation, the accurate angular velocity is given. Finally the approximate expression for circular velocity of solar system's vortex motion is presented. For ordinary vortex motion the circular velocity is inversely proportional to the radius r, but for solar system's vortex motion, it is inversely proportional to $r^{3/2}$.

（7）The problem caused by mass-velocity relation

For the mass-velocity relation $m = m_0 / \sqrt{1 - u^2 / c^2}$, obviously the most unreasonable result is that when the velocity tends to infinity, the mass also tends to infinity; another unreasonable one is that the velocity cannot be greater than the speed of light.

Some problems of relativity and the unreasonable results can only be seen outside

the scope of physics.

Supposing that one apple is placed in universal space, and it is sold by its mass. For the reason that the observations from different planets will get different velocities, namely its mass should have different results; thus, the buyers located on different planets should pay different prices. While, if the astronaut who's flying speed close to the speed of light and he wants to buy this apple, then he should pay a price close to infinity.

On this issue, we can return to the method of Newton mechanics: the mass of a body does not change with its moving speed, but the action (or effect) of this body will change according to its moving speed; and the mass of a body is determined based solely on the number of particles it contains.

（8）Problem can be solved by Newton mechanics but cannot be solved by relativity

There are many problems cannot be solved by general relativity such as a body is forced to move in flat space (for example, a small ball rolls along the inclined plane).

For the problem of a small ball rolls along the inclined plane, although the original law of gravity and Newton's second law can be used to solve it, the result is not consistent with principle of conservation of energy.

In reference [5], solving an example of a small ball rolls along the inclined plane with principle of conservation of energy and deriving improved Newton's second law and improved law of gravity simultaneously with the forms of constant dimension fractal and variable dimension fractal. The results are as folows.

The improved law of gravity with the form of constant dimension fractal is as follows

$$F = -\frac{GMm}{r^{1.99989}}$$

The improved Newton's second law with the form of constant dimension fractal is as follows

$$F = ma^{1.01458}$$

For the results of variable dimension fractal, supposing that the improved Newton's second law is as follows: $F = ma^{1+\varepsilon}$, $\varepsilon = k_1 u$; the improved law of gravity is as follows: $F = -GMm/r^{2-\delta}$, $\delta = k_2 u$; where, u is the horizon distance that the small ball is rolling.

After determining the values of k_1, k_2, we get the results of variable dimension fractal as follows

$$\varepsilon = 8.779\times10^{-8}u\,,\quad \delta = 1.206\times10^{-12}u$$

The results of variable dimension fractal are much better than that of constant dimension fractal.

（9）Whether or not the field equations of general relativity can be derived without Newton's law of gravity

As establishing the field equations of general relativity, through a series of mathematical derivation, ultimately it has to rely on Newton's law of gravity. While the law of gravity is not consistent with the principle of general covariance. Whether or not the field equations of general relativity can be derived without Newton's law of gravity? Nobody can answer this question so far.

Relying on Newton's law of gravity to establish the field equations of general relativity, also face a problem: If Newton's law of gravity is improved, whether or not the field equations of general relativity should be rederived according to this improved law or formula?

This question has now become further research topics, because there have been improved Newton's universal gravitation formula and the like.

For example, in reference [5], the following improved Newton's universal gravitation formula is presented

$$F = -\frac{GMm}{r^2} - \frac{3G^2M^2mp}{c^2r^4}$$

where: G is gravitational constant, M and m are the masses of the two objects, r is the distance between the two objects, c is the speed of light, p is the half normal chord for the object m moving around the object M along with a curve, and the value of p is given by: $p = a(1-e^2)$ (for ellipse), $p = a(e^2-1)$ (for hyperbola), $p = y^2/2x$ (for parabola).

This improved Newton's universal gravitation formula can give the same results as given by general relativity for the problem of planetary advance of perihelion and the problem of gravitational defection of a photon orbit around the Sun.

For the problem of planetary advance of perihelion, the improved Newton's universal gravitation formula reads

$$F = -\frac{GMm}{r^2} - \frac{3G^2M^2ma(1-e^2)}{c^2r^4}$$

For the problem of gravitational defection of a photon orbit around the Sun, the improved Newton's universal gravitation formula reads

$$F = -\frac{GMm}{r^2} - \frac{1.5GMm_0^2r}{r^4}$$

where: r_0 is the shortest distance between the light and the Sun, if the light and the Sun is tangent, it is equal to the radius of the Sun. The funny thing is that, for this problem, the maximum gravitational force given by the improved Newton's universal gravitation formula is 2.5 times of that given by the original Newton's law of gravity.

（10）Contradictions between relativity and principle of conservation of energy

Based on the special theory of relativity, if a photon (or a particle with speed of light) is moving in the gravitational field of the Sun, its kinetic energy does not change, but its potential energy should change according to the distance being apart from the Sun, thus it is contrary to the principle of conservation of energy.

Based on the general theory of relativity, the orbit of a planet such as mercury is

non-closed, whether or not this is contrary to the principle of conservation of energy, it is still an unsolved problem.

3 Main shortcomings of relativity

The two main shortcomings of relativity are as follows: firstly, applying mathematical principle (rather than physical principle) as the main principle to solve physics problems; secondly, it does not consider the principle of conservation of energy.

If mathematical principle can be used (instead of physical principle) as the main principle to solve physics problems, mathematicians will dominate in physics and almost all scientific fields. But this is clearly not possible.

In the field of physics, mathematics is only a tool. Applying mathematics to command physics, rather than applying physics to command mathematics, that is the most misleading of Einstein to physics. Because of this misleading, except a few success, we do not know how many times and energies of outstanding people (including Einstein himself) were wasted.

According to reference [7]: so far only the “law of conservation of energy” can be considered as the unique truth in physics. As for other “laws”, they are correct only in the cases that they are not contradicted with law of conservation of energy or they can be derived by law of conservation of energy; otherwise their probability of correctness should be determined by law of conservation of energy or experiment (currently for the most cases the correctness can only be determined by experiment). Besides law of conservation of energy, all other laws of conservation in physics may not be correct (or their probabilities of correctness are all less than 100%). In addition, the essential shortcomings of special relativity and general relativity are caused from the reason that law of conservation of energy was not considered at the established time of these two theories; therefore the results of relativity will appear the examples contradicted with law of conservation of energy, and in the area of general relativity the attempt to derive the correct expression of energy will never be successful.

4 Applying principle of conservation of energy to improve and restrict (or constrain) the related formulas and equations of relativity (such as the field equations of general relativity)

Referring to references [2, 6] for applying least square method to establish "partial and temporary unified theory of natural science so far" including all the equations of natural science so far (in which, the theory of everything to express all of natural laws, described by Hawking that a single equation could be written on a T-shirt, is partially and temporarily realized in the form of "partial and temporary unified variational principle of natural science so far"), the related formulas and equations of relativity can be improved and restricted (or constrained) by principle of conservation of energy, and thus these formulas and equations can satisfy the principle of conservation of energy.

The general form of the principle of conservation of energy is as follows

$$E(t) = E(0) = cons$$

or

$$1-\frac{E(t)}{E(0)}=0$$

Einstein's field equations of general relativity can be written as follows

$$R_{ab}-\frac{1}{2}Rg_{ab}=\kappa T_{ab}$$

Applying principle of conservation of energy to improve and restrict (or constrain) the field equations of general relativity, it gives the following variational principle

$$\Pi=\int_{\Omega}F^2d\Omega+w\int_{t_1}^{t_2}(1-\frac{E(t)}{E(0)})^2dt=\min_0$$

where, $F=R_{ab}-\frac{1}{2}Rg_{ab}-\kappa T_{ab}$, $\min_0$ indicates the minimum and its value should be equal to zero; w is a suitable positive weighted constant.

As applying principle of conservation of energy to improve and restrict (or constrain) other related formulas and equations of relativity, the similar method can be used.

5 Conclusions

This paper discusses some problems that special and general relativity cannot solve or induce wrong results. Certainly, this doesn't mean that, the special theory of relativity and general theory of relativity are completely wrong. For some questions, the special theory of relativity and general theory of relativity also may produce the correct conclusions or the approximate results [1]. Before relativity can be replaced, referring to "partial and temporary unified theory of natural science so far", the related formulas and equations of relativity can be improved and restricted (or constrained) by principle of conservation of energy, and thus these formulas and equations can satisfy the principle of conservation of energy.

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Chapter 6: New Three laws of Planetary Motion

New Three laws of Planetary Motion

Abstract: According to improved Newton's gravitational formula, variable dimension fractal method and steepest descent method, this paper presents the new three laws of planetary motion: (1) Accurate gravitational formula between Sun and planet, and accurate gravitational formula between Sun and photon for problem of light bending around Sun; (2) Two kinds of improved Titius-Bode laws; (3) Relation between planetary average moving speed and its average distance to Sun with variable dimension fractal form. By using the second and third laws to predict the un-found planet outside the Neptune (formerly known as the tenth planet), its average distance to Sun equals 59.54 AU, and its average moving speed equals 3.85km/s.
Key words: Planetary motion, new three laws, accurate gravitational formula, improved Titius-Bode law, distance-velocity relation

Introduction

From 1609 to 1618, Kepler discovered the so-called Kepler's three laws of planetary motion: (1) The orbit of every planet is an ellipse with the Sun at one of the two foci; (2) A line joining a planet and the Sun sweeps out equal areas during equal intervals of time; (3) The square of the orbital period of a planet is proportional to the cube of the semi-major axis of its orbit.

About 400 years later, now we try to present the new three laws of planetary motion: (1) Accurate gravitational formula between Sun and planet, and accurate gravitational formula between Sun and photon for problem of light bending around Sun; (2) Two kinds of improved Titius-Bode laws; (3) Relation between planetary average moving speed and its average distance to Sun with variable dimension fractal form.

1 Accurate gravitational formula between Sun and planet

In References [1] and [2], with the help of the equation derived by Prof. Hu Ning according to general relativity, and Binet's formula, we present the following improved Newton's formula of universal gravitation

$$F=-\frac{GMm}{r^2}-\frac{3G^2M^2mp}{c^2r^4} \qquad (1)$$

where: G is gravitational constant, M and m are the masses of the two objects, r is the distance between the two objects, c is the speed of light, p is the half normal chord for the object m moving around the object M along with a curve, and the value of p is given by: $p = a(1-e^2)$ (for ellipse), $p = a(e^2-1)$ (for hyperbola), $p = y^2/2x$ (for parabola).

The improved Newton's universal gravitation formula (Eq.(1)) can give the same results as given by general relativity for the problem of planetary advance of perihelion and the problem of gravitational defection of a photon orbit around the Sun.

It should be noted that, this improved Newton's formula of universal gravitation can also be written as the form of variable dimension fractal (in which the fractal dimension is a variable, instead of a constant).

Suppose

$$F = -\frac{GMm}{r^D} = -\frac{GMm}{r^2} - \frac{3G^2M^2mp}{c^2r^4} \qquad (2)$$

It gives

$$D = -\ln\left(\frac{1}{r^2} + \frac{3GMp}{c^2r^4}\right) / \ln r \qquad (3)$$

Substituting the relevant parameters of the ellipse into Eq.(1), it gives the accurate gravitational formula between Sun and planet

$$F = -\frac{GMm}{r^2} - \frac{3G^2M^2ma(1-e^2)}{c^2r^4} \qquad (4)$$

In addition, for the problem of gravitational defection of a photon orbit around the Sun, the accurate gravitational formula between Sun and photon reads

$$F = -\frac{GMm}{r^2} - \frac{1.5GMm_0^2r}{r^4} \qquad (5)$$

where: r_0 is the shortest distance between the light and the Sun, if the light and the Sun is tangent, it is equal to the radius of the Sun.

The funny thing is that, for this problem, the maximum gravitational force given by Eq.(5) (as $r = r_0$) is 2.5 times of that given by the original Newton's law of gravity.

2 Two kinds of improved Titius-Bode laws

The original Titius-Bode law is a hypothesis for the average distance between the Sun and the planet.

It can be expressed as follows: considering the distances to Sun from the near to the far, for the corresponding n-th planet (for Mercury, n is equal to -∞, instead of 1. For Venus, Earth, Mars, Asteroid Belt, Jupiter, Saturn, Uranus, and Neptune; n is equal to 2, 3, 4, 5, 6, 7, 8, and 9 respectively), its average distance to Sun (astronomical unit AU) reads

$$a = 0.4 + 0.3 \times 2^{n-2} \qquad (6)$$

For the original Titius-Bode law, there is an unreasonable point, that is, for Mercury, n

is equal to -∞, instead of 1. As we improve the Titius-Bode law, for Mercury, n is equal to 1.

Now we present the two forms' improve Titius-Bode laws.

The first form is similar to the original Titius-Bode law (while the constants will be newly selected), the planetary average distance to Sun (AU) reads

$$a_n = x_1 + x_2 \times x_3^{n-x_4} \qquad (7)$$

where: for Mercury, Venus, Earth, Mars, Asteroid Belt, Jupiter, Saturn, Uranus, Neptune and so on; n is equal to 1, 2, 3, 4, 5, 6, 7, 8, 9 and so on respectively.

Now we utilize the least-squares method to determine the undetermined constants in Eq.(7).

Assume that corresponding to the real average distance a_n', the calculated value is a_n', we consider that the quadratic sum of the relative errors of the calculated values and the real values reaches the minimum, that is, applying the following variational principle to determine the undetermined constants.

$$\Pi = \sum_1^9 \left(\frac{a_n' - a_n}{a_n'}\right)^2 = \min \qquad (8)$$

Substituting the calculated values and the real values into Eq.(8), after applying the steepest descent method, we get the following optimal solution.

x_1=0.1804362， x_2=0.5869832， x_3=1.84711， x_4=2.486026

It gives the first kind of improved Titius-Bode law

$$a_n = 0.1804362 + 0.5869832 \times 1.84711^{n-2.486026} \qquad (9)$$

The quadratic sum of the relative errors calculated by Eq.(9) is equal to $\Pi = 4.771078 \times 10^{-2}$, while the quadratic sum of the relative errors calculated by the original Titius-Bode law is equal to $\Pi_0 = 9.272933 \times 10^{-2}$. Obviously, the improved result is better than the original result.

Table 1 shows the comparison between the first kind of improved Titius-Bode law and the original Titius-Bode law.

Table 1. Comparison between the first kind of improved Titius-Bode law and the original Titius-Bode law

Celestial Body	Real average distance to Sun	Result of original formula	Result of Eq.(9)
Mercury	0.39	0.4	0.42
Venus	0.72	0.7	0.62
Earth	1	1	0.99
Mars	1.52	1.6	1.67
Asteroid Belt	2.9	2.8	2.93
Jupiter	5.20	5.2	5.25

Saturn	9.54	10	9.55
Uranus	19.18	19.6	17.48
Neptune	30.06	38.8	32.14

From Table 1 we can see that, for Neptune, the relative error calculated by the original Titius-Bode law is equal to -29.1%, while the relative error calculated by the improved Titius-Bode law Eq.(9) is only equal to -6.9%.

By using Eq.(9), the un-found planet outside the Neptune (formerly known as the tenth planet) can be predicted. Substituting $n=10$ into Eq.(9), we can predict that its average distance to Sun is as follows

$$a_{10}=59.21 \text{ (AU)} \qquad (10)$$

It should be noted that, on November 11, 1940, Liu Zihua published his French monograph entitled "Cosmos of the Eight Diagrams — Prediction of A New Planet", in which he predicted that the tenth planet's average distance to Sun is equal to 7.4 billion km (49.3 AU), this result is comparatively close to the predicted result given by Eq.(9) (Liu Zihua's result is about 16.7% less than that of Eq.(9)).

Now we discuss the second improved Titius-Bode laws with the form of variable dimension fractal, its expression only contains 3 undetermined constants as follows

$$a_n=\frac{C}{n^{d_0+d_1 n}} \qquad (11)$$

Substituting the calculated values and the real values into Eq.(8), after applying the steepest descent method, we get the following optimal solution.

C=0.3803499，d_0=-0.3061203，d_1=-0.1890803

It gives the second kind of improved Titius-Bode law

$$a_n=\frac{0.3803499}{n^{-0.3061203-0.1890803n}} \qquad (12)$$

The quadratic sum of the relative errors calculated by Eq.(12) is equal to $\Pi=5.42992\times10^{-2}$, while the quadratic sum of the relative errors calculated by the original Titius-Bode law is equal to $\Pi_0=9.272933\times10^{-2}$. Obviously, this improved result is also better than the original result.

Table 2 shows the comparison between the second kind of improved Titius-Bode law and the original Titius-Bode law.

Table 2. Comparison between the second kind of improved Titius-Bode law and the original Titius-Bode law

Celestial Body	Real average distance to Sun	Result of original formula	Result of Eq.(9)
Mercury	0.39	0.4	0.38

Venus	0.72	0.7	0.61
Earth	1	1	0.99
Mars	1.52	1.6	1.66
Asteroid Belt	2.9	2.8	2.85
Jupiter	5.20	5.2	5.03
Saturn	9.54	10	9.07
Uranus	19.18	19.6	16.70
Neptune	30.06	38.8	31.34

From Table 2 we can see that, for Neptune, the relative error calculated by the original Titius-Bode law is equal to -29.1%, while the relative error calculated by the improved Titius-Bode law Eq.(12) is only equal to -4.3%.

By using Eq.(12), the un-found planet outside the Neptune (formerly known as the tenth planet) can also be predicted. Substituting $n=10$ into Eq.(12), we can predict that its average distance to Sun is as follows

$$a_{10}=59.86 \text{ (AU)} \qquad (13)$$

This result is very close to the result of 59.21 given by Eq.(10), the difference is only equal to 1.1%. Taking the average of the two values, it gives

$$a_{10}=59.54 \text{ (AU)} \qquad (14)$$

3 Relation between planetary average moving speed and its average distance to Sun with variable dimension fractal form

By using the formula that $\frac{GMm}{r^2}=\frac{mv^2}{r}$, many scholars have derived the following approximate formula for the relation between planetary average moving speed and its average distance to Sun.

$$r_{av}\approx\frac{GM}{v_{av}^2} \qquad (15)$$

Supposing that the unit of the planetary average distance to Sun is taken as the astronomical unit (AU), the unit of the planetary average moving speed is taken as km/s, and taking the accurate data as follows: the mass of Sun M=1.98892x10^{30}kg, the gravitational constant G=6.67221937 x10^{-11}N·m^2/kg^2, and 1AU=1.4959787x10^8 km, then Eq.(15) can be reduced as follows

$$r_{av}\approx\frac{88.7079}{v_{av}^2} \qquad (15')$$

If we want to get an accurate formula, it can be written as the following form of

variable dimension fractal

$$r_{av} = \frac{GM}{v_{av}^{D}} \qquad (16)$$

And the accurate value of D can be written as follows

$$D = \frac{\ln GM - \ln r_{av}}{\ln v_{av}} \qquad (17)$$

For different planets, the accurate values of D are shown in table 3.

Table 3. The accurate values of D

Celestial Body	Accurate value of D
Mercury	2.0036
Venus	2.0013
Earth	2.0001
Mars	2.0020
Jupiter	2.0001
Saturn	1.9994
Uranus	1.9986
Neptune	1.9983

Taking average, it gives

$$D_{av} = 2.0004 \qquad (18)$$

According to Eq.(16), the planetary average moving speed reads

$$v_{av} = \exp(\frac{\ln GM - \ln r_{av}}{D}) \qquad (19)$$

Substituting $a_{10} = 59.54$ (AU) into Eq.(19), for the un-found planet outside the Neptune (formerly known as the tenth planet), we can predict that its average moving speed is as follows

v_{av} =3.85km/s

Eq.(19) can also be utilized to test that whether or not some data are compatible. For example, besides predicted that the tenth planet's average distance to Sun is equal to 7.4 billion km (49.3 AU), Liu Zihua also predicted that its average moving speed is equal to 2km/s. While according to Eq.(19), its average moving speed should be equal to 4.24km/s.

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The Rate That the Earth Is Getting Further Away From the Sun

Abstract: The mass of the Sun is reduced due to the radiation of the Sun, which causes that the planets are getting further away from the Sun. According to theoretical derivation, the rate that the planet is getting further away from the Sun equals the rate of solar mass reduction. Currently the rate that the Earth is getting further away from the Sun equals 1.02m per century, for Mercury it equals 0.40m per century, and for Pluto it equals 40.32m per century.

Key words: Sun, planet, Earth, rate, get further away from

Introduction

Whether on not the average distance between the planet and the Sun is unchanged? The answer is the negative. The reason for this is that the mass of the Sun is reduced, so the gravitation between the Sun and planet is also reduced, which leads to the planet is getting further away from the Sun. Based on theoretical derivation, this paper discusses the rate that the planet is getting further away from the Sun.

1 The rate that the planet is getting further away from the Sun

Firstly we derive the relationship between the rate that the planet is getting further away from the Sun and the rate that the mass of the Sun is reduced.

The law of gravity reads

$$F = -\frac{GMm}{r^2} \qquad (1)$$

where, G is gravitational constant, M is the mass of the Sun, m is the mass of the planet, r is the distance between the Sun and the planet.

As the planet is getting further away from the Sun, the work of gravity is as follows

$$F_{av}(-\Delta r) = \frac{1}{2}\left(\frac{GM_1m_1}{r_1^2} + \frac{GM_2m_2}{r_2^2}\right)\Delta r \qquad (2)$$

where, F_{av} is the average value of gravity, $\Delta r = r_2 - r_1$.

Supposing that the mass of the planet is unchanged, namely

$$m_1 = m_2 = m \qquad (3)$$

Omitting the second order term, Eq.（2） is simplified as follows

$$F_{av}(-\Delta r) \approx \frac{GM_1 m}{r_1^2}\Delta r \qquad (4)$$

As the planet is getting further away from the Sun, its total energy is changed as follows

$$E_2 - E_1 = \frac{mv_2^2}{2} - \frac{GM_2 m}{r_2} - \frac{mv_1^2}{2} + \frac{GM_1 m}{r_1} \qquad (5)$$

In reference [1], the following formula is applied

$$\frac{GMm}{r^2} = \frac{mv^2}{r} \qquad (6)$$

It gives

$$v^2 r = GM \qquad (7)$$

Substituting Eq.（7） into Eq.（5）, it gives

$$E_2 - E_1 = \frac{GM_2 m}{2r_2} - \frac{GM_2 m}{r_2} - \frac{GM_1 m}{2r_1} + \frac{GM_1 m}{r_1} \qquad (8)$$

Hence

$$E_2 - E_1 = -\frac{GM_2 m}{2r_2} + \frac{GM_1 m}{2r_1} \qquad (9)$$

Substituting $M_2 = M_1 + \Delta M$， $r_2 = r_1 + \Delta r$ into Eq.（9）, it gives

$$E_2 - E_1 = -\frac{G(M_1 + \Delta M)m}{2(r_1 + \Delta r)} + \frac{GM_1 m}{2r_1} \qquad (10)$$

Because

$$\frac{1}{r_1 + \Delta r} \approx \frac{1}{r_1} - \frac{\Delta r}{r_1^2}$$

Therefore Eq.（10） becomes

$$E_2 - E_1 \approx -\frac{G(M_1 + \Delta M)m}{2}\left(\frac{1}{r_1} - \frac{\Delta r}{r_1^2}\right) + \frac{GM_1 m}{2r_1} \qquad (11)$$

Omitting the second order term, Eq.（11） is simplified as follows

$$E_2 - E_1 \approx -\frac{G\Delta M m}{2r_1} + \frac{GM_1 m\Delta r}{2r_1^2} \qquad (12)$$

According to the law of conservation of energy, we have

$$F_{av}(-\Delta r) = E_2 - E_1 \qquad (13)$$

Substituting Eq.（4） and Eq.（12） into Eq.（13）, it gives

$$\frac{GM_1m}{r_1^2}\Delta r \approx -\frac{G\Delta Mm}{2r_1}+\frac{GM_1m\Delta r}{2r_1^2} \qquad (14)$$

Hence

$$\frac{\Delta r}{r_1} \approx -\frac{\Delta M}{M_1} \qquad (15)$$

Namely, the rate that the planet is getting further away from the Sun equals the rate of solar mass reduction.

2 Calculation examples

Einstein's mass-energy formula is as follows

$$E = m\hat{c} \qquad (16)$$

The given data are as follows, currentlly the total solar radiation power equals 3.86×10^{26}J/s，the mass of the Sun equals 1.98892×10^{30}kg，then we have the rate of solar mass reduction per second is as follows

$$\Delta M = -4.29\times10^{9}\,\mathrm{kg} \qquad (17)$$

According to Eq.(15), the distance that the planet is getting further away from the Sun is as follows

$$\Delta r \approx -\frac{\Delta M}{M_1}r_1 \qquad (18)$$

That means that, currently the distance that the Earth is getting further away from the Sun is as follows

$$\Delta r \approx 3.23\times10^{-10}\,\mathrm{m}$$

Namely, currently the rate that the Earth is getting further away from the Sun equals 1.02m per century.

Currently the distances that the nine planets are getting further away from the Sun can be found in Table 1.

Table 1 The current distances that the nine planets are getting further away from the Sun per century（unit：m）

Planet	Average distance to the Sun (Earth=1)	Distance that the planet is getting further away from the Sun per century
Mercury	0.39	0.40
Venus	0.72	0.73
Earth	1	1.02
Mars	1.52	1.55
Jupiter	5.20	5.30
Saturn	9.54	9.73
Uranus	19.18	19.56
Neptune	30.06	30.66

Pluto	39.53	40.32

3 Conclusions

Due to the mass of the Sun is reduced, the planets are getting further away from the Sun. According to theoretical derivation, from Mercury to Pluto, the current distances that the nine planets are getting further away from the Sun per century are as follows respectively: 0.40, 0.73, 1.02, 1.55, 5.30, 9.73, 19.56, 30.66, 40.32 (unit: m)..

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Chapter 8: Jointly Solving Problem of Advance of Mercury's Perihelion With Law of Gravity and General Relativity

Jointly Solving Problem of Advance of Mercury's Perihelion With Law of Gravity and General Relativity

Abstract: According to "partial and temporary unified theory of natural science so far" including all the equations so far related to natural science, two different theories can be applied to jointly solve the same problem. For jointly solving problem of advance of Mercury's perihelion with law of gravity and general relativity, three methods are presented. First, the advance of planetary perihelion is the combined result of two motions; According to law of gravity, the elliptical motion creates the perihelion, and the solar system's vortex motion creates the advance of perihelion, while the parameters of advance are given by general relativity. Second, according to law of gravity and general relativity, the improved formula of universal gravitation can be derived; by using this improved formula, the classical mechanics can be used to solve the problem of advance of planetary perihelion and the problem of gravitational deflection of photon orbit around the sun, while these solutions are the same as given by general relativity. Third, according to the variational principle of "partial and temporary unified theory of natural science so far", for problem of advance of Mercury's perihelion, the optimization method can be used to reach the optimal approximate solution satisfying law of gravity and general relativity simultaneously.

Key words: Partial and temporary unified theory of natural science so far, law of gravity, general relativity, variational principle, advance of Mercury's perihelion

Introduction

In reference [1], we presented "partial and temporary unified theory of natural science so far" including all the equations so far related to natural science, according to this unified theory, the different theories and related results can be applied to jointly solve the same problem. As an example, jointly solving problem of advance of Mercury's perihelion with law of gravity and general relativity will be discussed in this paper, and three methods are presented.

1 Advance of planetary perihelion is the combined result of two motions

This problem has been basically solved in reference [2], the result may be rewritten as follows.

Many scholars believe that general relativity does not end the studying for problem of advance of planetary perihelion, because there are many factors affecting the advance of planetary perihelion, therefore it still needs to continue to study this issue.

Although the explanation of general relativity for the advance of planetary perihelion is reasonably consistent with the observed data, because its orbit is not closed, whether or not it is consistent with the law of conservation of energy has not been verified. For this reason, jointly applying law of gravity and general relativity, a new explanation is presented: The advance of planetary perihelion is the combined result of two motions. The first elliptical motion creates the perihelion, and the second vortex motion creates the advance of perihelion. In the motion of planet-sun system, under the action of gravity, the planetary orbit is a closed ellipse, and consistent with the law of conservation of energy. Meanwhile, the planet also participates in the vortex motion of solar system taking the sun as center; the long-term trend of the vortex is the further topic, but in the short-term may be considered that due to the inertia the planetary perihelion will run circular motion in vortex and lead to the advance of perihelion, thus also without acting against the law of conservation of energy. Based on the result of general relativity, the approximate angular velocity of advance of perihelion is given.

According to general relativity, the value of advance of planetary perihelion reads

$$\varepsilon = \frac{24\pi^3 a^2}{T^2 c^2 (1-e^2)} \qquad (1)$$

where: c is the speed of light; T, a, and e are orbital period, semi-major axis and eccentricity respectively.

According to Eq.(1), taking the Sun as center, the angular velocity of advance of planetary perihelion is as follows

$$\omega = \frac{\varepsilon}{T} = \frac{24\pi^3 a^2}{T^3 c^2 (1-e^2)} \qquad (2)$$

According to Kepler's third law, it gives

$$\frac{T^2}{a^3} = \frac{4\pi^2}{GM}$$

where: G is the gravitational constant, and M is the solar mass.

Then Eq. (2) can be rewritten as

$$\omega = \frac{3G^{3/2}M^{3/2}}{a^{5/2}c^2(1-e^2)} \qquad (3)$$

According to this expression we can see that, the angular velocity of advance of planetary perihelion is inversely proportional to $a^{5/2}$, and the velocity of advance of planetary perihelion is inversely proportional to $a^{3/2}$.

For the results of Eq.(1), there are small differences compared with accurate astronomical observations, so we say that results of Eq.(2) and Eq.(3) are the approximate angular velocities of advance of perihelion based on the related results of general relativity.

If based on accurate astronomical observation, we can reach the accurate angular velocity of advance of perihelion as follows.

$$\omega' = \frac{\varepsilon'}{T}$$

where: ε' is the accurate astronomical observation of advance of perihelion.

Now the rotate transformation in Cartesian coordinate system is applied to derive the planetary orbit equation including the advance of perihelion.

In the planet-sun system, taking the solar center as the origin of coordinate, the planetary orbit equation reads

$$\frac{(x-k)^2}{a^2} + \frac{y^2}{b^2} = 1$$

where: k is the semi-focal length of ellipse.

According to the rotate transformation in Cartesian coordinate system, it gives

$$x = x'\cos\theta - y'\sin\theta$$

$$y = x'\sin\theta + y'\cos\theta$$

where: θ is the angle of rotation (namely the angle of advance), $\theta = \omega t$ or $\theta = \omega' t$.

Thus, after considering the vortex motion, the planetary rotation orbit equation is as follows

$$\frac{(x'\cos\theta - y'\sin\theta - k)^2}{a^2} + \frac{(x'\sin\theta + y'\cos\theta)^2}{b^2} = 1$$

2 Deriving the improved formula of universal gravitation with law of gravity and general relativity

This problem has been basically solved in reference [3], the result may be rewritten as follows.

As discussing the problem of planet's movement around the sun according to the general relativity, the following equation can be given

$$u''+u=\frac{1}{p}+\frac{3GMu^2}{c^2} \tag{4}$$

where, $u=\frac{1}{r}$; G – gravitational constant; M – mass of sun; c – velocity of light; p - half normal focal chord.

Due to the central force, the orbit differential equation (Binet's formula) reads

$$h^2u^2(u''+u)=-\frac{F}{m} \tag{5}$$

where, h^2 – a constant.

Substituting Eq.(4) into Eq.(5), we have

$$F=-mh^2u^2(\frac{1}{p}+\frac{3GMu^2}{c^2}) \tag{6}$$

The original law of gravity reads

$$F=-\frac{GMm}{r^2}=-GMmu^2 \tag{7}$$

For Eq.(6) and Eq.(7), comparing the terms including u^2, we have

$$h^2=GMp$$

Substituting h^2 into Eq.(6), it gives

$$F=-GMmu^2-\frac{3G^2M^2mpu^4}{c^2} \tag{8}$$

Substituting $u=\frac{1}{r}$ into Eq.(8), the improved law of gravity reads

$$F=-\frac{GMm}{r^2}-\frac{3G^2M^2mp}{c^2r^4} \tag{9}$$

where: G is gravitational constant, M and m are the masses of the two objects, r is the distance between the two objects, c is the speed of light, p is the half normal chord for the object m moving around the object M along with a curve, and the value of p is given by: $p = a(1-e^2)$ (for ellipse), $p = a(e^2-1)$ (for hyperbola), $p = y2/2x$ (for parabola).

By using this improved formula, the classical mechanics can be used to solve the problem of advance of planetary perihelion and the problem of gravitational deflection of photon orbit around the sun, while these solutions are the same as given by general relativity.

3 For problem of advance of Mercury's perihelion, the optimal approximate solution satisfying law of gravity and general relativity simultaneously

Now according to the variational principle of "partial and temporary unified theory of natural science so far", namely "partial and temporary unified variational principle of

natural science so far", for problem of advance of Mercury's perihelion, the optimization method can be used to reach the optimal approximate solution satisfying law of gravity and general relativity simultaneously. On the one hand, this optimal approximate solution is better than the result given by general relativity, while it is worse than the result given by law of gravity; on the other hand, this optimal approximate solution is better than the result given by law of gravity, while it is worse than the result given by general relativity.

In order to deal with all natural science issues in a unified way, in reference [1], "partial and temporary unified theory of natural science so far" is presented with the least squares method, and it can be expressed by the following form of "partial and temporary unified variational principle of natural science so far".

$$\Pi_{\mathrm{NATURE}}=\sum_{1}^{n}W_i\int_{\Omega_i}F_i^2d\Omega_i+\sum_{1}^{m}W_j'S_j^2=\min_0 \qquad (10)$$

where: $\min_0$ was introduced in reference [1], indicating the minimum and its value should be equal to zero. W_i and W_j' are suitable positive weighted constants; for the simplest cases, all of these weighted constants can be taken as 1. If only a certain equation is considered, we can only make its corresponding weighted constant is equal to 1 and the other weighted constants are all equal to 0. The subscript NATURE denotes that the suitable scope is all of the problems of natural science; all of the equations $F_i=0$ denote so far discovered (derived) all of the equations related to natural science (they can be run the integral operation), and all of the equations $S_i=0$ denote so far discovered (derived) all of the solitary equations related to natural science (they cannot be run the integral operation).

In this way, the theory of everything to express all of natural laws, described by Hawking that a single equation could be written on a T-shirt, is partially and temporarily realized in the form of "partial and temporary unified variational principle of natural science so far".

In variational principle Eq.(10), if we only consider the equation of planetary motion around the Sun according to the law of gravity, it gives the following variational principle

$$\Pi_1=\int_0^{2\pi}(u''+u-\frac{1}{p})^2\mathrm{d}\varphi=\min_0 \qquad (11)$$

Its exact solution is as follows

$$u=\frac{1+e\cos\varphi}{p}=\frac{1+e\cos\varphi}{a(1-e^2)} \qquad (12)$$

In variational principle Eq.(10), if we only consider the equation of planetary motion (Eq.(4)) around the Sun according to the general relativity, it gives the following variational principle

$$\Pi_2 = \int_0^{2\pi+\varepsilon} (u''+u-\frac{1}{p}-\frac{3GM\tilde{u}^2}{c^2})^2 = \min \quad (13)$$

The approximate solution of Eq.(4) is as follows

$$u \approx \frac{GM}{a(1-e^2)c^2}[1+e\cos(-\frac{3GM}{a(1-e^2)c^2})\varphi] \quad (14)$$

From this eqution, the value of advance of planetary perihelion per round (ε) is shown in Eq.(1).

It should be noted that, the approximate solution Eq.(14) is not the optimal approximate solution derived by variational principle Eq.(13). While in reference [4], based on the variational principle Eq.(13), the optimal approximate solution is presented.

Now, jointly applying the law of gravity and general relativity, we can get the following variational principle

$$\Pi = w_1\Pi_1 + w_2\Pi_2 = \min \quad (15)$$

where, w_1 and w_2 are suitable positive weighted constants; for the simplest cases, we can take $w_1 = w_2 = 1$.

Obviously, according to the variational principle Eq.(15), the optimization method can be used to reach the optimal approximate solution satisfying law of gravity and general relativity simultaneously. On the one hand, for satisfying variational principle Eq.(11), this optimal approximate solution is better than the result given by general relativity, while it is worse than the result given by law of gravity; on the other hand, for satisfying variational principle Eq.(13), this optimal approximate solution is better than the result given by law of gravity, while it is worse than the result given by general relativity.

For the reason that the problem of solving variational principle Eq.(15) is complicated, the specific solution process will be discussed in another paper.

5 Conclusions

According to "partial and temporary unified theory of natural science so far" including all the equations so far related to natural science, three methods can be applied for jointly solving problem of advance of Mercury's perihelion with law of gravity and general relativity. Thus, the correctness and practicability of "partial and temporary unified theory of natural science so far" are demonstrated.

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Chapter 9: Gravitational wave cannot be existed independently and coupling waves of gravitational wave and electromagnetic wave and the like

Gravitational wave cannot be existed independently and coupling waves of gravitational wave and electromagnetic wave and the like

Abstract: As any object which temperature is greater than absolute zero will radiate electromagnetic wave, therefore the gravitational wave cannot be existed independently, while the gravitational-electromagnetic coupling wave (GE wave) is existed. At present, all the experiments to detect the independent gravitational wave will end in failure. It is the only way that through the detection and research of GE wave to indirectly detect and research gravitational waves. The GE wave may be a new kind of wave, instead of the simple superposition of gravitational wave and electromagnetic wave. GE wave may also be existed in noise, the correct program should be firstly detecting GE wave in the noise, then through the GE wave to research the nature of gravitational wave. For the observation of double stars PSR1913+16, it obtains the indirect evidence of GE wave, instead of gravitational wave. Based on this GE wave, the nature of gravitational wave can also be researched. Finally, detecting and researching other coupling waves associated with gravitational wave may pave the new way to detect and research the gravitational wave.
Key words： Gravitation, gravitational wave, cannot be existed independently, gravitational-electromagnetic coupling wave (GE wave)

1 Gravitational wave cannot be existed independently

Why gravitational wave cannot be existed independently? The reason is quite simple, any object which temperature is greater than absolute zero will radiate electromagnetic wave, however in universe the object which temperature is equal to or lower than absolute zero cannot be existed. In other words, any object will radiate electromagnetic wave at any time. Therefore, for the macroscopic object, gravitational wave cannot be existed independently, while the gravitational-electromagnetic coupling wave (GE wave) is

existed.

At present, all the experiments to detect the independent gravitational wave will end in failure.

It should be noted that, the GE wave may be a new kind of wave, instead of the simple superposition of gravitational wave and electromagnetic wave. To illustrate this viewpoint, we can see the example of elastic-plastic theory. For a thin circular plate heated in its center, when the temperature is reached to a certain extent, three zones will be existed: plastic zone, elastic-plastic zone and elastic zone. Plastic problem can be solved by using the plastic theory, and elastic problem can be solved by using the elastic theory, however, the coupling elastic-plastic problem cannot be solved by simply using the superposition of the elastic result and the plastic result, in order to solve this problem, a new theory, namely elastic-plastic theory must be established. For the same reason, we can assume that the GE wave may be a new kind of wave, and the related new theory should be established. For this reason, the difficulty to detect and research GE wave is also increased.

Now we can assume that GE wave can carry energy, and in vacuum its speed is equal to the speed of light.

2 How to detect and research gravitational wave

At present there are two main programs to detect gravitational wave: direct detection and indirect detection.

For the direct detection program, generally to eliminate noise is required, and the result is that up to now the people have gained nothing. While we believe that GE wave may also be existed in noise, eliminating noise, of course will lose the chance of detecting gravitational wave. The correct program should be as follows: firstly detecting GE wave in the noise, then through the GE wave to research the nature of gravitational wave. Of course, such detection and research are also very difficult.

For the indirect detection program, the most successful case is the observation of double stars PSR1913+16, it obtains the so-called indirect evidence of gravitational radiation, and the two observers R. A. Hulse and J. H. Taylor won the 1993 Nobel Prize. But according to our point of view, for the observation of double stars PSR1913+16, it obtains the indirect evidence of GE wave, instead of gravitational wave. Based on this GE wave, the nature of gravitational wave can be researched. Of course, such research is very difficult too.

Whether or not other method can be used to detect and research gravitational wave? We try to answer this question.

As well-known, there exist four fundamental interactions in nature. Considering all the possible cases, then theoretically there may be a total of 15 types of waves:

(1) Electromagnetic wave (E wave);

(2) Gravitational wave (G wave);

(3) Strong interaction wave (S wave) caused by strong interaction;

(4) Weak interaction wave (W wave) caused by weak interaction;

(5) Gravitational-electromagnetic coupling wave (GE wave);

(6) Gravitational-strong coupling wave (GS wave);

(7) Gravitational-weak coupling wave (GW wave);
(8) Electromagnetic-strong coupling wave (ES wave);
(9) Electromagnetic-weak coupling wave (EW wave);
(10) Strong-weak coupling wave (SW wave);
(11) Gravitational-electromagnetic-strong coupling wave (GES wave);
(12) Gravitational-electromagnetic-weave coupling wave (GEW wave);
(13) Gravitational-strong-weak coupling wave (GSW wave);
(14) Electromagnetic-strong-weak coupling wave (ESW wave);
(15) Gravitational-electromagnetic-strong-weak coupling wave (GESW wave).

In these 15 types of waves, besides GE wave, there are other 6 types of coupling waves associated with gravitational wave: GS wave, GW wave, GES wave, GEW wave, GSW wave and GESW wave. Detecting and researching these 6 types of coupling waves associated with gravitational wave, may pave the new way to detect and research the gravitational wave.

3 Conclusions

Gravitational wave cannot be existed independently. The experiments to detect the independent gravitational wave will waste considerable human and financial resources, and cannot be successful. The right way is that through detecting and researching the coupling waves of gravitational wave and electromagnetic wave or other waves to indirectly detect and research gravitational wave.

Chapter 10: Errors in Nobel Prize for Physics (1) ——Strict Unified Theory Cannot be Existed

Errors in Nobel Prize for Physics (1)
——Strict Unified Theory Cannot be Existed

Abstract: One of the reasons for 1979 Nobel Prize for physics is "for their contributions to the theory of the unified weak and electromagnetic interaction between elementary particles". While the strict "unified theory" cannot be existed, there is only "partial and temporary unified theory so far". Applying least square method, "partial and temporary unified electromagnetic theory so far", "partial and temporary unified gravitational theory so far", "partial and temporary unified theory of four fundamental interactions so far", and "partial and temporary unified theory of natural science so far" can be established. In this way, the theory of everything to express all of natural laws, described by Hawking that a single equation could be written on a T-shirt, is partially and temporarily realized in the form of "partial and temporary unified variational principle of natural science so far".
Key words: Unified theory, cannot be existed, partial and temporary unified theory so far, partial and temporary unified variational principle so far, partial and temporary unified theory of natural science so far, partial and temporary unified variational principle of

natural science so far, Hawking, T-shirt

Introduction

One of the reasons for 1979 Nobel Prize for physics is "for their contributions to the theory of the unified weak and electromagnetic interaction between elementary particles". While there is a conceptual mistake: the strict "unified theory" cannot be existed, there is only "partial and temporary unified theory so far" (sometimes it may be simplified as "unified theory so far"). In other words, "the theory of the unified weak and electromagnetic interaction" cannot be existed, and there is only "partial and temporary theory of the unified weak and electromagnetic interaction so far". In fact, not only the "unified theory" of two or more than two interactions cannot be existed, but also the "unified theory" of any kind of interaction cannot be existed. In other words, the "unified electromagnetic theory" cannot be existed, so do the "unified gravitational theory", the "unified strong interaction theory", and the "unified weak interaction theory". However, if the "unified theory" is changed into "partial and temporary unified theory so far", then it can be existed. What is the "unified theory"? In 1980, Stephen Hawking once claimed, physicists have seen the outline of "final theory", this theory of everything can express all laws of nature with a single and beautiful mathematical model, perhaps that it is so simple and can be written on a T-shirt.

In other words, for any field, the strict "unified theory" refers to that all the laws of this field can be expressed in a single mathematical model.

If following this concept to understand the strict "unified theory", we have to say, such a "unified theory" is simply cannot be existed. In other words, there is only "partial and temporary unified theory so far".

Now we discuss that the strict "unified electromagnetic theory" cannot be existed.

1 Why the strict "unified electromagnetic theory" cannot be existed and applying least square method to establish "partial and temporary unified electromagnetic theory so far"

It might be argued that Maxwell's equations are "unified electromagnetic theory". Facing with this argument, we ask three questions. First, whether or not all the electromagnetic laws can be included or derived by Maxwell's equations? Second, whether or not the later appeared high temperature superconductivity problem and the like can be solved by Maxwell's equations? Third, whether or not the faster-than-light （FTL） problems can be solved by Maxwell's equations? If negative answers were given to these three questions, then it should be acknowledged that Maxwell's equations are not strict "unified electromagnetic theory", but only "partial and temporary unified electromagnetic theory".

Based on the same reason, the "theory of the unified weak and electromagnetic interaction" cannot be existed, and there is only "partial and temporary theory of the unified weak and electromagnetic interaction so far".

Now we establish the "partial and temporary unified electromagnetic theory so far".

First of all, for any field, applying least square method to establish this field's "partial and temporary unified theory so far" (the corresponding expression is "partial and temporary unified variational principle so far").

Supposing that for a certain domain Ω, we already establish the following general equations

$$F_i = 0 \qquad (i = 1,2 \to n) \tag{1}$$

On boundary V, the boundary conditions are as follows

$$B_j = 0 \qquad (j = 1,2 \to m) \tag{2}$$

Applying least square method, for this field and the domains and boundary conditions the "partial and temporary unified theory so far" can be expressed in the following form of "partial and temporary unified variational principle so far"

$$\Pi = \sum_1^n W_i \int_\Omega F_i^2 d\Omega + \sum_1^m W_j' \int_V B_j^2 dV = \min_0 \tag{3}$$

where: $\min_0$ was introduced in reference [1], indicating the minimum and its value should be equal to zero. W_i and W_j' are suitable positive weighted constants; for the simplest cases, all of these weighted constants can be taken as 1. If only a certain equation is considered, we can only make its corresponding weighted constant is equal to 1 and the other weighted constants are all equal to 0.

By using this method, we already established the "partial and temporary unified water gravity wave theory so far" and the corresponding "partial and temporary unified water gravity wave variational principle so far" in reference [2]; and established the "partial and temporary unified theory of fluid mechanics so far" and the corresponding "partial and temporary unified variational principle of fluid mechanics so far" in reference [3].

Some scholars may said, this is simply the application of least square method, our answer is: the simplest way may be the most effective way.

It should be noted that, due to that time we cannot realize that the strict "unified theory" cannot be existed, therefore in references [2] and [3], the wrong ideas that "unified water gravity wave theory", "unified water gravity wave variational principle", "unified theory of fluid mechanics" and "unified variational principle of fluid mechanics" were appeared. Now we correct these mistakes in this paper.

It should also be noted that, Eq.(2) can be included in Eq.(1), therefore we will only discuss Eq.(1), rather than discuss Eq.(2).

Now we write Maxwell's equations as follows

$F_1 = 0$, in domain Ω_1

where: $F_1 = \nabla \bullet D - \rho$

$F_2 = 0$, in domain Ω_2

where: $F_2 = \nabla \times E + \partial B / \partial t$

$F_3 = 0$, in domain Ω_3

where： $F_3 = \nabla \bullet B$

$F_4 = 0$, in domain Ω_4

where： $F_4 = \nabla \times H - j - \partial D / \partial t$

In addition, for isotropic medium, the following equations should be added

$F_5 = 0$, in domain Ω_5

where： $F_5 = D - \varepsilon_0 \varepsilon_r E$

$F_6 = 0$, in domain Ω_6

where： $F_6 = B - \mu_0 \mu_r H$

$F_7 = 0$, in domain Ω_7

where： $F_7 = j - \gamma E$

Besides these equations, the Coulomb's law reads

$F_8 = 0$, in domain Ω_8

where： $F_8 = f - \frac{k q_1 q_2}{r^2}$, according to the experimental data, k =9.0×10^{9}N·m²/C².

Due to the limited space, other equations of electromagnetism are no longer listed. Also, a number of conservation equations (such as the equation of conservation of energy), and a number of laws (such as the law of composition of velocities), are also no longer listed. All of them will be discussed below.

In addition, some solitary equations established only for the solitary points or special cases can be written as follows

$$S_j = 0 \qquad (j = 1,2 \to m) \qquad (4)$$

For example, the scale factor in the Coulomb's law can be written as the following solitary equation

$S_1 = 0$

where： $S_1 = k - 9.0\times10^9 \mathrm{N\cdot m^2/C^2}$。

Another example is that, in plasma problem, the shielding distance (Debye distance) can be written as the following solitary equation

$S_2 = 0$

where： $S_2 = D - \sqrt{\varepsilon_0 kT / ne^2}$.

Also due to limited space, other electromagnetic solitary equations are no longer listed.

For the reason that some solitary equations cannot be run the integral process, they will be run the square sum process.

Applying least square method, "partial and temporary unified electromagnetic theory so far" can be expressed in the following form of "partial and temporary unified electromagnetic variational principle so far"

$$\Pi_{\mathrm{EM}} = \sum_{1}^{n} W_i \int_{\Omega_i} F_i^2 d\Omega_i + \sum_{1}^{m} W_j' S_j^2 = \min_0 \qquad (5)$$

where: the subscript EM denotes that the suitable scope is the electromagnetism, all of the equations $F_i = 0$ denote so far discovered (derived) all of the equations related to electromagnetism, all of the equations $S_i = 0$ denote so far discovered (derived) all of the solitary equations related to electromagnetism, and W_i and W_j' are suitable positive weighted constants.

Clearly, here n and m are all very large integers.

2 Applying least square method to establish "partial and temporary unified gravitational theory so far"

Firstly, it should be noted that, for different gravitational problems, the different formulas or different gravitational theories should be applied. The "universal gravitational formulas or equations" actually cannot be existed. For this conclusion, many scholars do not realize it. In addition, all of the different gravitational formulas can be written as the form of Eq.(1) (namely the form that the right side of the expression is equal to zero).

The first formula should be mentioned is Newton's universal gravitational formula

$$F = -\frac{GMm}{r^2} \qquad (6)$$

It can be written as the following form

$$F_1 = 0 \qquad (6')$$

where: $F_1 = F + \dfrac{GMm}{r^2}$

Prof. Hu Ning derived an equation according to general relativity, with the help of Hu's equation and Binet's formula, in reference [4] we derived the following improved Newton's formula of universal gravitation

$$F = -\frac{GMm}{r^2} - \frac{3G^2M^2mp}{c^2r^4} \qquad (7)$$

where: G is gravitational constant, M and m are the masses of the two objects, r is the distance between the two objects, c is the speed of light, p is the half normal chord for the

object m moving around the object M along with a curve, and the value of p is given by: p = a(1-e^2) (for ellipse), p = a (e^2-1) (for hyperbola), p = y^2/2x (for parabola).

This formula can give the same results as given by general relativity for the problem of planetary advance of perihelion and the problem of gravitational defection of a photon orbit around the Sun.

It can be written as the following form

$$F_2 = 0 \qquad (7')$$

where: $F_2 = F + \frac{GMm}{r^2} + \frac{3G^2M^2mp}{c^2r^4}$

It should be noted that, according to Eq.(6) and Eq.(7) the FTL can be existed.

In some cases, we should also consider the following gravitational formula including three terms

$$F = -\frac{GMm}{r^2}(1 + \frac{3GMp}{c^2r^2} + \frac{wG^2M^2p^2}{c^4r^4}) \qquad (8)$$

where: w is a constant to be determined.

It can be written as the following form

$$F_3 = 0 \qquad (8')$$

where: $F_3 = F + \frac{GMm}{r^2}(1 + \frac{3GMp}{c^2r^2} + \frac{wG^2M^2p^2}{c^4r^4})$

But for the example that a small ball rolls along the inclined plane in the gravitational field of the Earth, all of the above mentioned formulas cannot be applied. In reference [5], we present the following gravitational formula with the variable dimension fractal form (the fractal dimension is variable, instead of constant).

$$F = -GMm/r^{2-\delta} \qquad (9)$$

where: $\delta = 1.206 \times 10^{-12}u$, u is the horizon distance that the small ball rolls.

It can be written as the following form

$$F_4 = 0 \qquad (9')$$

where: $F_4 = F + GMm/r^{2-\delta}$

In addition, the gravitational field equations of Einstein's theory of general relativity, and the gravitational formula and gravitational equations derived by other scholars, can also be written as the form of Eq.(1) (namely the form that the right side of the expression is equal to zero).

In some cases, when dealing with gravitational problem, we should also consider some principle of conservation, such as the principle of conservation of energy. Here we write the principle of conservation of energy as the form of Eq.(1) (namely the form that the right side of the expression is equal to zero). So do the other principles of

conservation.

In references [5], we discussed two cases to apply the principle of conservation of energy directly and indirectly.

To apply the principle of conservation of energy directly is as follows.

Supposing that the initial total energy of a closed system is equal to $W(0)$, and for time t the total energy is equal to $W(t)$, then according to the principle of conservation of energy, it gives

$$W(0)=W(t) \qquad (10)$$

It can be written as the following form

$$F_5=\frac{W(t)}{W(0)}-1=0 \qquad (11)$$

To apply the principle of conservation of energy indirectly is as follows.

Supposing that we are interested in a special physical quantity Q, not only it can be calculated by using the principle of conservation of energy, but also can be calculated by using other gravitational formula. For distinguishing the values, let's denote the value given by other laws as Q, while denote the value given by the principle of conservation of energy as Q', then the equation to apply the principle of conservation of energy indirectly is as follows

$$F_6=\frac{Q}{Q'}-1=0 \qquad (12)$$

Now we discuss some solitary equations established only for the solitary points or special cases.

The first one is the solitary equation about the gravitational constant.

$$S_1=G-6.67\times10^{-11}\,\mathrm{N\cdot m^2/kg^2}=0 \qquad (13)$$

The second one is considering the deflection angle for the problem of gravitational defection of a photon orbit around the Sun.

By using general relativity or improved Newton's formula of universal gravitation (namely Eq.(7)), the deflection angle ϕ_0 reads

$$\phi_0=1.75''$$

However, according to the experiment, we should have $\phi=1.77\pm0.20$, taking the average, it gives

$$\phi=1.77''$$

According to this expression, the corresponding solitary equation is as follows

$$S_2=\phi-1.77''=0 \qquad (14)$$

Other solitary equations include: the solitary equations established by the values of planetary advance of perihelion, the solitary equations established by the unusual values of gravity at different times during total solar eclipse, and the like. Due to the limited space, they are no longer listed.

Applying least square method, "partial and temporary unified gravitational theory so far" can be expressed in the following form of "partial and temporary unified gravitational variational principle so far"

$$\Pi_{\mathrm{GRAVITY}}=\sum_{1}^{n}W_i\int_{\Omega_i}F_i^2d\Omega_i+\sum_{1}^{m}W_j'S_j^2=\min_0 \qquad (15)$$

where: the subscript GRAVITY denotes that the suitable scope is the gravity, all of the equations $F_i=0$ denote so far discovered (derived) all of the equations related to gravity, all of the equations $S_i=0$ denote so far discovered (derived) all of the solitary equations related to gravity, and W_i and W_j' are suitable positive weighted constants.

It should be noted that, as we establish "partial and temporary unified theory so far" and the corresponding "partial and temporary unified variational principle so far", the including phenomenon is allowed. For example, the three terms gravitational formula Eq.(8) includes Eq.(7), while Eq.(7) includes Eq.(6). But we still consider these three equations simultaneously. This is because that, in some cases Eq.(7) is more convenient; as for Eq.(6), it is enough in most cases, moreover, putting Eq.(6) at the most prominent position, express our respect to Newton who is the greatest scientist in the history. In addition, the coexisting phenomenon is also allowed. For example, the gravitational formulas of classical mechanics, the gravitational field equations of Einstein's theory of general relativity, and the equations of other gravitational theories are coexisting. For the solution that is satisfying two or more than two theories simultaneously, or solving the problems in different fields simultaneously, and the like, we will discuss them in other papers (such solutions may only be reached with the method of variational principle).

Now we discuss the applications of variational principle Eq.(15).

Example 1. Setting $W_2=1$ and $W_1'=1$ in variational principle Eq.(15), and other weighted constants are all equal to 0, namely applying Eq.(7) and Eq.(13) to derive the changing rule for the gravitational coefficient G' (instead of the gravitational constant G) and make the gravitational formula in accordance with the inverse square law.

In references [6], changing Eq.(7) into the following form in accordance with the inverse square law

$$F=-\frac{G'Mm}{r^2}$$

It gives

$$-\frac{G'Mm}{r^2}=-\frac{GMm}{r^2}-\frac{3G^2M^2mp}{c^2r^4}$$

Then we have the changing rule for the gravitational coefficient G' as follows

$$G' = G(1 + \frac{3GMp}{c^2 r^2}) \qquad (16)$$

For problem of Mercury's advance of perihelion, we have

$$(1 + 5.038109 \times 10^{-8})G \le G' \le (1 + 1.162308 \times 10^{-7})G$$

For problem of gravitational defection of a photon orbit around the Sun, we have

$$G \le G' \le 2.5G$$

Example 2. Setting $W_4 = 1$ and $W_6 = 1$ in variational principle Eq.(15), and other weighted constants are all equal to 0, namely applying Eq.(9) and Eq.(12) to determine the unknown δ in Eq.(9).

According to Eq.(12), variational principle Eq.(15) can be simplified into the following form applied the law of conservation of energy indirectly

$$\Pi = \int_{x_1}^{x_2} (\frac{Q}{Q'} - 1)^2 dx = \min_0 \qquad (17)$$

The solution procedure can be found in reference [5]. For the final optimum approximate solution, the value of Π calculated by the improved universal gravitational formula and improved Newton's second law is equal to 0.1906446, it is only 0.033% of the value of Π_0 calculated by the original universal gravitational formula and original Newton's second law.

Example 3. Setting $W_3 = 1$ and $W_2' = 1$ in variational principle Eq.(15), and other weighted constants are all equal to 0, namely applying Eq.(8) and Eq.(14) to determine the unknown w in Eq.(8).

The solution procedure can be found in reference [6], the final result is as follows.

The range of value of w is as follows

$0.08571 \le w \le 0.42857$

Taking the average, it gives

$w = 0.25714$

For the problem of gravitational defection of a photon orbit around the Sun, the general relativity cannot give the solution that is exactly equal to the experimental value, while the method presented in this paper can do so.

It should be noted that, for variation principle Eq.(15), if there is an exact solution, then its right side can be equal to 0, here the variational principle Eq.(15) is exactly equivalent to $F_i = 0$ and $S_i = 0$ (see example 1 and example 3). If there is only an approximate solution, the right side of variational principles Eq.(15) can only be approximately equal to 0, at this moment we can apply the appropriate optimization method to seek the best approximate solution, and the effect of the solution can be judged

according to the extent that the value of Π is close to 0 (see example 2).

3 Other "partial and temporary unified theory so far", especially "partial and temporary unified theory of natural science so far"

To extend the above mentioned method, we can get various "partial and temporary unified theory so far".

For unified dealing with the problems of four fundamental interactions, applying least square method, "partial and temporary unified theory of four fundamental interactions so far" can be expressed in the following form of "partial and temporary unified variational principle of four fundamental interactions so far"

$$\Pi_{G.E.S.W}=\sum_{1}^{n}W_i\int_{\Omega_i}F_i^2d\Omega_i+\sum_{1}^{m}W_j'S_j^2=\min \qquad (18)$$

where: the subscript G.E.S.W denotes that the suitable scope is the four fundamental interactions, all of the equations $F_i=0$ denote so far discovered (derived) all of the equations related to four fundamental interactions, all of the equations $S_i=0$ denote so far discovered (derived) all of the solitary equations related to four fundamental interactions, and W_i and W_j' are suitable positive weighted constants.

For unified dealing with the problems of natural science, applying least square method, "partial and temporary unified theory of natural science so far" can be expressed in the following form of "partial and temporary unified variational principle of natural science so far"

$$\Pi_{NATURE}=\sum_{1}^{n}W_i\int_{\Omega_i}F_i^2d\Omega_i+\sum_{1}^{m}W_j'S_j^2=\min \qquad (19)$$

where: the subscript NATURE denotes that the suitable scope is all of the problems of natural science, all of the equations $F_i=0$ denote so far discovered (derived) all of the equations related to natural science, all of the equations $S_i=0$ denote so far discovered (derived) all of the solitary equations related to natural science, and W_i and W_j' are suitable positive weighted constants.

In this way, the theory of everything to express all of natural laws, described by Hawking that a single equation could be written on a T-shirt, is partially and temporarily realized in the form of "partial and temporary unified variational principle of natural science so far".

As already noted, for "partial and temporary unified theory so far" and the corresponding "partial and temporary unified variational principle so far", the including phenomenon and coexisting phenomenon are allowed. Here we would like to point out that, besides the including process and coexisting process, the simplifying process is also

allowed. For example, the first simplifying result of "partial and temporary unified theory of natural science so far" is "theory of conservation of energy", it can be expressed in the following form of "first simplifying variational principle for partial and temporary unified theory of natural science so far" (it is shorted as "variational principle of conservation of energy").

$$\Pi_{\text{NATURE}}^{\text{SIMPLE–1}} = \int_{t_1}^{t_2} (W(t)/W(0)-1)^2 dt = \min_0 \qquad (20)$$

This "variational principle of conservation of energy" can be applied for unified dealing with many problems in physics, mechanics, astronomy, biology, engineering, and even many issues in social science. For example, in reference [7], based on "theory of conservation of energy", for some cases we derived Newton's second law, the law of universal gravitation, and the like.

Further topics are finding more simplifying processes (simplifying variational principles) and their combinations. These will make "partial and temporary unified theory of natural science so far" simpler, clearer, more perfect, and more practical.

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Chapter 11: Errors in Nobel Prize for Physics (2) ——Exist at least seven states of accelerating expansion & contraction and the like in universe

Errors in Nobel Prize for Physics (2) ——Exist at least seven states of accelerating expansion & contraction and the like in universe

Abstract: One of the reasons for 2011 Nobel Prize for physics is "for the discovery of the accelerating expansion of the universe through observations of distant supernovae". But "the accelerating expansion of the universe" is debatable. Through mathematical derivation, according to Hubble's law, the values of far away distance, far away speed, far away acceleration of a galaxy, and the force acted on this galaxy are all the exponential functions of time, these reach the unreasonable conclusions: as time tends to infinity, all of these values will tend to infinity too. Due to the observation of distance is limited, at most we can say: "partial universe is in the state of expansion (including accelerating expansion)." In addition, partial universe (such as the area nearby a black hole) is in the state of contraction. Therefore the correct conclusion is that there exist at least seven states of accelerating expansion and contraction and the like in the universe, namely "partial universe is in the state of accelerating expansion, partial universe is accelerating contraction, partial universe is uniform expansion, partial universe is uniform contraction, partial universe is decelerating expansion, partial universe is decelerating contraction, and partial universe is neither expansion nor contraction".
Key words: Accelerating expansion of the universe, expansion of the partial universe, contraction of the partial universe, neither expansion nor contraction of the partial universe, Hubble's law, black hole

Introduction

In 1929, Hubble, an astronomer of the United States, found the famous Hubble's law. According to Hubble's law, some scholars reach the conclusion of the accelerating expansion of the universe. One of the reasons for 2011 Nobel Prize for physics is "for the discovery of the accelerating expansion of the universe through observations of distant supernovae".

But "the accelerating expansion of the universe" is debatable. Due to the observation of distance is limited, at most we can say: "partial universe is in the state of expansion (including accelerating expansion)."

As well-known, all of the absolute, solitary and one-sided viewpoints are completely wrong. For example, in reference [1] we already pointed out that the strict "unified theory" cannot be existed, there is only "partial and temporary unified theory so far".

Through Mathematical derivation, it can be concluded that Hubble's law will lead to unreasonable results. Therefore, Hubble's law needs to be amended or replaced by other law. Considering all possible situations, the correct conclusion is that there exist at least seven states of accelerating expansion and contraction and the like in the universe, namely "partial universe is in the state of accelerating expansion, partial universe is accelerating contraction, partial universe is uniform expansion, partial universe is uniform contraction, partial universe is decelerating expansion, partial universe is decelerating contraction, and partial universe is neither expansion nor contraction".

1 The unreasonable results caused by Hubble's Law

Hubble's law reads

$$V = H_0 \times D \qquad (1)$$

where：V —（galaxy's） far away speed, unit: km / s；H_0 —Hubble's Constant, unit: km / (s．Mpc)；D —（galaxy's） far away distance, unit: Mpc.

According to Hubble's law, we have

$$V = \frac{dD(t)}{dt} = H_0 \times D(t) \qquad (2)$$

From this differential equation, it gives

$$D = ke^{H_0 t} = k\exp(H_0 t) \qquad (3)$$

where：k — a constant to be determined; if we assume that the distance is positive, then its value is positive too.

It gives the far away speed as follows

$$V = kH_0 \exp(H_0 t) \qquad (4)$$

The far away acceleration is as follows

$$a = dV / dt = kH_0^2 \exp(H_0 t) \qquad (5)$$

According to Newton's second law, the force acted on this galaxy is as follows

$$F = ma = mkH_0^2 \exp(H_0 t) \qquad (6)$$

Based on these equations, apparently we can reach the unreasonable conclusions: as time tends to infinity, all of the values will tend to infinity too.

If Hubble's law needs to be amended, the conclusion of "the accelerating expansion of the universe" also needs to be amended. At least it should be amended as "the accelerating expansion of the partial universe."

2 The states of contraction and the like of the partial universe

Many scholars have presented the state of contraction of the universe (or partial universe). Here we stress that partial universe (such as the area nearby a black hole) is in the state of contraction.

As well-known, the mass of black hole (or similar black hole) is immense, and it produces a very strong gravitational field, so that all matters and radiations (including the electromagnetic wave or light) will be unable to escape if they enter to a critical range around the black hole.

The viewpoint of "the accelerating expansion of the universe" unexpectedly turns a blind eye to the fact that partial universe (such as the area nearby a black hole) is in the state of contraction.

To sum up, considering all possible situations, the correct conclusion is that there exist at least seven states of accelerating expansion and contraction and the like in the universe, namely "partial universe is in the state of accelerating expansion, partial universe is accelerating contraction, partial universe is uniform expansion, partial universe is uniform contraction, partial universe is decelerating expansion, partial universe is decelerating contraction, and partial universe is neither expansion nor contraction". As for the detailed study for these seven states, it will be the further topic in future.

Besides these seven states, due to the limitations of human knowledge, there may be other unknown states.

3 Conclusions

All of the absolute, solitary and one-sided viewpoints are completely wrong, and in physics we should avoid these views as far as possible. The application scope of Hubble's law should be reconsidered, and the viewpoint that "the accelerating expansion of the universe" should be also reconsidered.

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Chapter 12: Errors in Nobel Prize for Physics (3) ——Conservation of Energy Leads to Probability Conservation of Parity, Momentum and so on

Errors in Nobel Prize for Physics (3)
—Conservation of Energy Leads to Probability Conservation of Parity, Momentum and so on

Abstract: One of the reasons for 1957 Nobel Prize for physics is “for their penetrating investigation of the so-called parity laws which has led to important discoveries regarding the elementary particles”. While the concepts of parity laws (law of conservation of parity and law of nonconservation of parity) are questionable. For the experiment of Chien-Shiung Wu et al in 1957, the correct way of saying should be that the probability of conservation of parity is 71% and the probability of nonconservation of parity is only 29%. The essential reason for the phenomena of nonconservation (including nonconservation of parity, momentum, angular momentum and the like) is that so far only the “law of conservation of energy” can be considered as the unique truth in physics. As for other “laws”, they are correct only in the cases that they are not contradicted with law of conservation of energy or they can be derived by law of conservation of energy; otherwise their probability of correctness should be determined by law of conservation of energy or experiment (currently for the most cases the correctness can only be determined by experiment). Conclusion: besides law of conservation of energy, all other laws of conservation in physics may not be correct (or their probabilities of correctness are all less than 100%). Discussing the examples that law of conservation of momentum and law of conservation of angular momentum are not correct (their results are contradicted with law of conservation of energy). In addition, the essential shortcomings of special relativity and general relativity are caused from the reason that law of conservation of energy was not

considered at the established time of these two theories; therefore their results will appear the examples contradicted with law of conservation of energy, and in the area of general relativity the attempt to derive the correct expression of energy will never be success. Finally the examples deriving the improved Newton's second law and improved law of gravity according to law of conservation of energy are discussed, which show the great potentiality of law of conservation of energy, and giving full play to the role of law of conservation of energy will completely change the situation of physics.

Key words: Weak interaction, conservation of parity, nonconservation of parity, nonconservation of momentum, nonconservation of angular momentum, probability, law of conservation of energy, unique truth, expression of energy, improved Newton's second law, improved law of gravity

Introduction

The importance of law of conservation of energy is far from being fully understood, and its great potentiality is far from being fully realized.

One of the reasons for 1957 Nobel Prize for physics is “for their penetrating investigation of the so-called parity laws which has led to important discoveries regarding the elementary particles”. Why is the parity nonconservation? The essential reason for this is that so far only the "law of conservation of energy" will be qualified to become the unique truth in physics.

Not only we cannot prove that "law of conservation of parity" is not contradicted with law of conservation of energy, but also cannot prove that "law of conservation of parity" can be derived from law of conservation of energy, so the so-called "law of conservation of parity" is not correct. Similarly, the so-called “law of conservation of momentum” and “law of conservation of angular momentum” are not correct (or their probabilities of correctness are less than 100%).

By extension, all the physical laws that cannot be derived from law of conservation of energy are probably not correct (or their probabilities of correctness are less than 100%). For example, the special relativity and general relativity are not correct (or their probabilities of correctness are less than 100%) for the reason that law of conservation of energy was not considered at the established time of these two theories. Otherwise, all laws that can be derived from law of conservation of energy are correct. For example, the improved Newton's second law and improved law of gravity can be derived from law of conservation of energy.

1 Determine the probabilities of conservation of parity and nonconservation of parity according to the experiment of Chien-Shiung Wu et al in 1957

In the experiment of Chien-Shiung Wu et al in 1957, they found that the number of the electrons that exiting angle $\theta > 90°$ is 40% more than that of $\theta < 90°$. For this result, we cannot simply say that parity is conservation or nonconservation. The correct way of saying should be that the probability of conservation of parity is 71% and the probability of nonconservation of parity is only 29%.

Similarly, the probabilities of correctness for other laws of conservation should be determined by law of conservation of energy or experiment (currently for the most cases

the correctness can only be determined by experiment).

2 Examples that the law of conservation of momentum and law of conservation of angular momentum are not correct

In reference [1], an example is presented in which the law of conservation of momentum and law of conservation of angular momentum are not correct (the results are directly contradicted with law of conservation of energy).

Here we present the reason that the law of conservation of momentum and law of conservation of angular momentum are not correct in another way.

As well-known, in many cases, the law of conservation of momentum and law of conservation of angular momentum can be derived according to the original Newton's second law. However, in references [2] and [3], we have pointed out that in some cases the original Newton's second law is not correct, and the improved Newton's second law $F = ma^{1+\varepsilon}$ is needed to be applied. In this case, the law of conservation of momentum and law of conservation of angular momentum are no longer correct. Here, because the improved Newton's second law is derived according to the law of conservation of energy export, so we can say that based on the improved Newton's second law, the results of law of conservation of momentum and law of conservation of angular momentum are indirectly contradicted with the law of conservation of energy.

3 Example that relativity theory is contradicted with law of conservation of energy

The essential shortcomings of special relativity and general relativity are caused from the reason that law of conservation of energy was not considered at the established time of these two theories; therefore their results will appear the examples contradicted with law of conservation of energy.

For example, according to relativity theory, an object's speed cannot reach the speed of light. However, based on law of conservation of energy, when the speed of an object is close or equal to the speed of light, for breaking the light barrier, the speed of this object could be faster than light as it passes through the Sun's gravitational field.

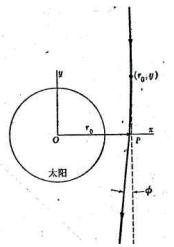

Figure 1. An object passes through the Sun's gravitational field at the speed of light

As shown in Figure 1, an object passes through the Sun's gravitational field at the speed of light from the infinite distance, assuming that its closest distance to the Sun is

equal to r_0, if the orbit of this object will be tangent to the Sun, then r_0 is equal to the radius of the Sun. Try to decide this object's maximum speed $v_{\max}$ as its distance to the Sun is equal to r_0.

For this problem, in reference [3], the improved law of gravity reads

$$F = -\frac{GMm}{r^2} - \frac{1.5GMm_0^2r}{r^4} \qquad (1)$$

For the reason that, as the object is located at the infinite distance, and the closest distance to the Sun, the energies should be equal, so we have

$$\frac{1}{2}mc^2 = \frac{1}{2}mv_{\max}^2 - \frac{1.5GMm}{r_0}$$

It gives

$$v_{\max} = \sqrt{c^2 + 3GM/r_0} \qquad (2)$$

Obviously this speed is faster than the speed of light, if the orbit of this object will be tangent to the Sun, after calculating it gives

$$v_{\max} = (1 + 3.18 \times 10^{-6})c \qquad (2A)$$

In addition, in the area of general relativity the attempt to derive the correct expression of energy will never be success. Einstein could not derive this expression of energy, other people also cannot derive it.

4 Deriving the improved Newton's second law and improved law of gravity according to law of conservation of energy

Now for an example, we simultaneously derive the improved Newton's second law and improved law of gravity according to law of conservation of energy, and it should be noted that they are suitable for this example only.

Firstly, the variational principles established by the law of conservation of energy can be given with least squares method (LSM).

Supposing that the initial total energy of a closed system equals $W(0)$, and for time t the total energy equals $W(t)$, then according to the law of conservation of energy:

$$W(0) = W(t) \qquad (3)$$

This can be written as:

$$R_W = \frac{W(t)}{W(0)} - 1 = 0 \qquad (4)$$

According to LSM, for the interval $[t_1, t_2]$, we can write the following variational principle:

$$\Pi = \int_{t_1}^{t_2} R_W^2 dt = \min_0 \qquad (5)$$

where: $\min_0$ denotes the minimum value of functional Π and it should be equal to zero.

It should be noted that, in many cases $W(t)$ is approximate, and R_W is not identically equal to zero, therefore Eq.(5) can be used to solve the problem.

Besides the time coordinate, another one can also be used. For example, for interval $[x_1, x_2]$, the following variational principle can be given according to the law of conservation of energy:

$$\Pi = \int_{x_1}^{x_2} R_W^2 dx = \min_0 \qquad (6)$$

The above-mentioned principles are established by using the law of conservation of energy directly. Sometimes, a certain principle should be established by using the law of conservation of energy indirectly. For example, a special physical quantity Q may be interested，not only it can be calculated by using the law of conservation of energy, but also can be calculated by using other laws (for this paper they are the law of gravity, and Newton's second law). For distinguishing the values, let's denote the value given by other laws as Q，while denote the value given by the law of conservation of energy as Q'，then the value of R_W can be redefined as follows:

$$R_W = \frac{Q}{Q'} - 1 = 0 \qquad (7)$$

Substituting Eq.（7）into Eqs.（5）and（6），as Q' is the result calculated with the law of conservation of energy, it gives the variational principle established by using the law of conservation of energy indirectly. Otherwise, it is clear that the extent of the value of Q accords with Q'.

Substituting the related quantities into Eq.（5）or Eq.（6），the equations derived by the condition of an extremum can be written as follows:

$$\frac{\partial \Pi}{\partial a_i} = \frac{\partial \Pi}{\partial k_i} = 0 \qquad (8)$$

After solving these equations, the improved law of gravity, and Newton's second law can be reached at once. According to the value of Π, the effect of the solution can be judged. The nearer the value of Π is to zero, the better the effect of the solution. It should be noted that besides of solving equations, optimum-seeking methods could also be used for finding the minimum and the constants to be determined. In fact, the optimum seeking method will be used in this paper.

Now we solve an example. As shown in Fig.2, supposing that the small ball rolls along a long incline from A to B. Its initial velocity is zero and the friction and the rotational energy of small ball are neglected.

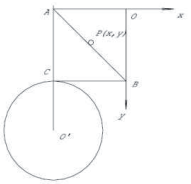

Fig.2 A small ball rolls from *A* to *B*

Supposing that circle O' denotes the Earth, M denotes its mass; m denotes the mass of the small ball (treated as a mass point P), O'A is a plumb line, coordinate x is orthogonal to O'A, coordinate y is orthogonal to coordinate x (parallel to O'A), BC is orthogonal to O'A. The lengths of OA, OB, BC, and AC are all equal to H, and O'C equals the radius R of the Earth.

In this example, the value of v_{P}^2 which is the square of the velocity for the ball located at point P is investigated. To distinguish the quantities, denote the value given by the improved law of gravity and improved Newton's second law as v_{P}^2, while v'^2_{P} denotes the value given by the law of conservation of energy, then Eq.(6) can be written as

$$\Pi = \int_{-H}^{0} (\frac{v_P^2}{v'^2_P} - 1)^2 dx = \min_0 \qquad (9)$$

Supposing that the improved law of gravity and improved Newton's second law can be written as the following constant dimension fractal forms

$$F = -\frac{GMm}{r^D} \qquad (10)$$

$$F = ma^{1+\varepsilon} \qquad (11)$$

where: D and ε are constants.

Now we calculate the related quantities according to the law of conservation of energy.

From Eq.(10), the potential energy of the small ball located at point P is

$$V = -\frac{GMm}{(D-1)r_{O'P}^{D-1}} \qquad (12)$$

According to the law of conservation of energy, we can get

$$-\frac{GMm}{(D-1)r_{O'A}^{D-1}} = \frac{1}{2}mv'^2_P - \frac{GMm}{(D-1)r_{O'P}^{D-1}} \qquad (13)$$

And therefore

$$v'^2_P = \frac{2GM}{D-1}[\frac{1}{r_{O'P}^{D-1}} - \frac{1}{(R+H)^{D-1}}] \qquad (14)$$

Now we calculate the related quantities according to the improved law of gravity and improved Newton's second law.

Supposing that the equation of rolling line is

$$y = x + H \tag{15}$$

For the ball located at point P,

$$dv/dt = a \tag{16}$$

because

$$dt = \frac{ds}{v} = \frac{\sqrt{2}dx}{v}$$

therefore $vdv = a\sqrt{2}dx$ (17)

According to the improved law of gravity, the force along to the tangent is

$$F_a = \frac{GMm}{r_{O'P}^D}\frac{1}{\sqrt{2}} \tag{18}$$

According to the improved Newton's second law, for point P, the acceleration along to the tangent is

$$a = (\frac{F_a}{m})^{1/1+\varepsilon} = (\frac{GM}{r_{O'P}^D\sqrt{2}})^{1/1+\varepsilon} \tag{19}$$

From Eq.（17）, it gives

$$vdv = \{\frac{GM}{[(H+x)^2+(R+H-y)^2]^{D/2}\sqrt{2}}\}^{1/1+\varepsilon}\sqrt{2}dx \tag{20}$$

Substituting Eq.(15) into Eq.(20), and for the two sides, we run the integral operation from A to P, it gives

$$v_P^2 = 2\int_{-H}^{x_P}\{\frac{GM}{[(H+x)^2+(R-x)^2]^{D/2}}\}^{1/1+\varepsilon}(\sqrt{2})^{\varepsilon/1+\varepsilon}dx \tag{21}$$

then the value can be calculated by a method of numerical integral.

The given data are assumed to be: for Earth, GM=3.99×$10^{14}$$m^3/s^2$; the radius of the Earth R=6.37×10^6m, H=R/10, try to solve the problem shown in Fig. 2, find the solution for the value of v_B^2, and derive the improved law of gravity and the improved Newton's second law.

Firstly, according to the original law of gravity, the original Newton's second law (i.e., let D=2 in Eq.(10), ε=0 in Eq.(11)) and the law of conservation of energy, all the related quantities can be calculated, then substitute them into Eq.(9), it gives

Π_0=571.4215

Here, according to the law of conservation of energy, it gives $v_B'^2$=1.0767×10^7, while according to the original law of gravity, and the original Newton's second law, it gives v_B^2=1.1351×10^7, the difference is about 5.4 %. For the reason that the value of Π_0 is not equal to zero, then the values of D and ε can be decided by the optimum seeking method. At present all the optimum seeking methods can be divided into two types, one type may not depend on the initial values which program may be complicated, and another type requires the better initial values which program is simple. One method of the second type, namely the searching method will be used in this paper.

Firstly, the value of D is fixed so let D=2，then search the value of ε，as ε=0.0146, the value of Π reaches the minimum 139.3429；then the value of ε is fixed，and search the value of D，as D=1.99989, the value of Π reaches the minimum 137.3238；then the value of D is fixed，and search the value of ε，as ε=0.01458, the value of Π reaches minimum 137.3231. Because the last two results are highly close, the searching can be stopped, and the final results are as follows

D=1.99989，ε=0.01458，$\prod$=137.3231

Here the value of Π is only 24% of Π_0. While according to the law of conservation of energy, it gives v'^2_B=1.0785×10^7，according to the improved law of gravity and the improved Newton's second law, it gives v^2_B=1.1073×10^7, the difference is about 2.7 % only.

The results suitable for this example with the constant dimension fractal form are as follows

The improved law of gravity reads

$$F=-\frac{GMm}{r^{1.99989}} \tag{22}$$

The improved Newton's second law reads

$$F=ma^{1.01458} \tag{23}$$

The above mentioned results have been published on reference [2].

According to the results for the example shown in Fig.2, it can be said that we could not rely on any experimental data, only apply the law of conservation of energy to derive the improved law of gravity, and improved Newton's second law; and demonstrate that the original Newton's law of gravity and Newton's second law are all tenable approximately for this example. So, can only apply the law of conservation of energy to derive that these two original laws or demonstrate they are tenable accurately in some cases? The answer is that in some cases we can indeed derive the original Newton's second law and prove the original Newton's law of gravity is tenable accurately.

Now, in the case that a small ball free falls (equivalent to free fall from A to C in Fig. 2), we derive the original Newton's second law and prove the original Newton's law of gravity is tenable accurately.

Assuming that for the original law of gravity and Newton's second law, the related exponents are unknown, only know the forms of these two formulas are as follows: $F=-\frac{GMm}{r^D}$, $F=ma^{D'}$; where: D and D' are undetermined constants.

As shown in Fig.2, supposing that a small ball free falls from point A to point C. Similar to the above derivation, when the small ball falls to point P (point P is not shown in Fig.2), the value of v^2_P calculated by the undetermined Newton's second law and the law of gravity, as well as the value of v'^2_P calculated by the law of conservation of energy are as follows:

$$v'^2_P=\frac{2GM}{D-1}\left[\frac{1}{r_{O'P}^{D-1}}-\frac{1}{(R+H)^{D-1}}\right]$$

$$v_P^2 = 2(GM)^{1/D'} \int_0^{y_p} (R+H-y)^{-D/D'} dy$$

$$v_P^2 = 2(GM)^{1/D'} \{ -\frac{1}{1-D/D'} [(R+H-y)^{1-D/D'}] \Big|_0^{y_p} \}$$

$$v_P^2 = \frac{2(GM)^{1/D'}}{(D/D')-1} [\frac{1}{r_{O'P}^{(D/D')-1}} - \frac{1}{(R+H)^{(D/D')-1}}]$$

Let $v_P^2 = v_P'^2$, then we should have: $1 = 1/D'$, and $D-1 = (D/D')-1$; these two equations all give: $D' = 1$, this means that for free fall problem, by using the law of conservation of energy, we strictly derive the original Newton's second law $F = ma$.

Here, although the original law of gravity cannot be derived (the value of D may be any constant, certainly including the case that D=2), we already prove that the original law of gravity is not contradicted to the law of conservation of energy, or the original law of gravity is tenable accurately.

For the example shown in Fig.2 that a small ball rolls along the inclined plane, in order to obtain the better results, we discuss the variable dimension fractal solution with Eq.(4) that is established by the law of conservation of energy directly.

Supposing that the improved Newton's second law and the improved law of gravity with the form of variable dimension fractal can be written as follows: $F = ma^{1+\varepsilon}$, $\varepsilon = k_1 u$; $F = -GMm/r^{2-\delta}$, $\delta = k_2 u$; where: u is the horizon distance that the small ball rolls （$u = x + H$）.

With the similar searching method, the values of k_1, k_2 can be determined, and the results are as follows

$$\varepsilon = 8.85 \times 10^{-8} u, \quad \delta = 2.71 \times 10^{-13} u$$

The results of variable dimension fractal are much better than that of constant dimension fractal. For example, the final $\Pi = 5.8662 \times 10^{-4}$, it is only 0.019% of Π_0 (3.1207). While according to the law of conservation of energy, it gives $v_B'^2$=1.0767×10^7, according to the improved law of gravity and the improved Newton's second law, it gives v_B^2=1.0777×10^7, the difference is about 0.093 % only.

The results suitable for this example with the variable dimension fractal form are as follows

The improved law of gravity reads

$$F = -\frac{GMm}{r^{2-2.71\times10^{-13}u}} \tag{24}$$

The improved Newton's second law reads

$$F = ma^{1+8.85\times10^{-8}u} \tag{25}$$

where: u is the horizon distance that the small ball rolls （$u = x + H$）

There is another problem should also be discussed. That is the improved kinetic energy formula. As well-known, the kinetic energy formula has been modified in the

theory of relativity, now we improve the kinetic energy formula with the law of conservation of energy.

Supposing that the improved kinetic energy formula is $E_d = \frac{1}{2}mv^{2-\lambda}$, $\lambda = k_3 u$; where: u is the horizon distance that the small ball rolls （$u = x + H$）.

With the similar searching method, we can get: $k_3 = 9.95 \times 10^{-13}$, then the improved kinetic energy formula with variable dimension fractal form reads

$$E_d = \frac{1}{2}mv^{2-9.95\times10^{-13}u}$$

Because the effect of improvement is very small (the value of Π is only improved from 5.8662×10^{-4} into 5.8634×10^{-4}), therefore these results should be for reference only.

5 Conclusions

In this paper, we reconsider the problems about conservation of parity and nonconservation of parity with a new viewpoint. For the experiment of Chien-Shiung Wu et al in 1957, the new conclusion is that the probability of conservation of parity is 71% and the probability of nonconservation of parity is only 29%. We point out that, besides law of conservation of energy, all other laws of conservation in physics may not be correct (or their probabilities of correctness are all less than 100%). So far, because only the law of conservation of energy can be qualified to become the unique truth in physics, therefore for all the theories and laws in physics (including the relativity theory, law of gravity, Newton's second law, law of conservation of momentum, law of conservation angular momentum, so-called parity laws, and so on), we should re-examine their relations with law of conservation of energy. In fact, many theories and laws (such as improved Newton's second law and improved law of gravity) can be derived according to law of conservation of energy, which show the great potentiality of law of conservation of energy, and giving full play to the role of law of conservation of energy will completely change the situation of physics. In addition, in a more wide range, the law of conservation of energy can be used to deal with all the problems related to energy in physics, astronomy, mechanics, engineering, chemistry, biology, and the like with a unified way.

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Chapter 13: Errors in Nobel Prize for Physics (4) ——There is no Strict Symmetry in

Errors in Nobel Prize for Physics (4)
——There is no Strict Symmetry in Nature

Abstract: In 1963, 1980 and 2008, the Nobel Prize for physics is related to symmetry principle, violation of symmetry, and broken symmetry respectively. These facts show the following viewpoint: In nature, not only symmetry principles exist, but also violations of symmetry and broken symmetries exist. While this paper presents the following viewpoint: There is no strict symmetry in nature, only approximate symmetry and partial and temporary symmetry can exixt; and for any symmetry, we can find the example of violation of symmetry or broken symmetry. For example, one case for violation of principle of general covariance is the fractal rule, because the fractal distribution is a straight line only in the double logarithmic coordinates. Theoretically, any equation in natural sciences and social sciences is corresponding to a symmetry and the related conserved quantity, and this conserved quantity can be equal to an arbitrary constant. The contradiction and incompatibility between symmetries are also discussed. For example, the incompatibility is existed between the symmetry for law of gravity and the symmetry for general relativity; and the law of conservation of energy generated by time translation symmetry is contradicted with the law of conservation of momentum generated by space translation symmetry and the law of conservation of angular momentum generated by space rotation symmetry. Although the symmetry for law of conservation of energy is only approximately correct, theoretically it could be considered as the unique symmetry in physics that is strictly correct. For other symmetries, they are correct only in the cases that they are not contradicted with this unique symmetry or they can be derived by this unique symmetry.
Key words: Symmetry, violation of symmetry, broken symmetry, symmetry for law of gravity, symmetry for general relativity, contradiction, incompatibility, law of conservation of energy, the only symmetry

Introduction

In 1963, Nobel Prize for physics was awarded partly because "for his contributions to the theory of the atomic nucleus and the elementary particles, particularly through the discovery and application of fundamental symmetry principles." In 1980, the winning topic of Nobel Prize for physics was "for the discovery of violations of fundamental symmetry principles in the decay of neutral K-mesons." In 2008, the reasons for Nobel Prize for physics were "for the discovery of the origin of the broken symmetry which predicts the existence of at least three families of quarks in nature" and "for the discovery of the mechanism of spontaneous broken symmetry in subatomic physics".

These facts show the following viewpoint: In nature, not only symmetry principles exist, but also violations of symmetry and broken symmetries exist. While this paper presents the following viewpoint: There is no strict symmetry in nature, only approximate symmetry and partial and temporary symmetry can exixt; and for any symmetry, we can

find the example of violation of symmetry or broken symmetry.

1 Violation of any symmetry

Symmetry for the law of physics means the invariance of the law under the certain condition of transformation. From this invariance, one kind of invariant quantity will be obtained, and it can be named conserved quantity.

According to this definition, for any symmetry, we can find the example of violation of symmetry or broken symmetry.

For establishing general relativity, Einstein proposed that "*All coordinate systems are essentially equivalent for the formulation of the general laws of nature*". This is the so-called principle of general covariance, or principle of general relativity.

There are a lot of counterexamples for principle of general covariance, or principle of general relativity. For example, in reference [1] we presented the following discussion on this issue.

As for the question of principle of relativity (the principle of general covariance), it does not need us to point out, Einstein himself already revised his original viewpoint. In other words, to withdraw a stride from his originally proposed principle of relativity (the principle of general covariance).

In reference [2] Einstein pointed out that, the following statement corresponds to the fundamental idea of the general principle of relativity: *"All Gaussian coordinate systems are essentially equivalent for the formulation of the general laws of nature."*

Here, Einstein already has obviously drawn back a step, from "*All coordinate systems are essentially equivalent for the formulation of the general laws of nature*", drew back to be restricted in "all Gaussian coordinate systems" only.

As for the reason to draw back this step, we cannot find the explanation.

A logical explanation is that the general principle of relativity has encountered the problem.

Moreover, it also has another question: Why has to draw back to "all Gaussian coordinate systems"? We cannot find the explanation also. A logical explanation is that, because the general theory of relativity used the Gaussian coordinate systems, therefore it could not draw back further.

It is difficult to understand that, Einstein already discarded the general principle of relativity, i.e., "*All coordinate systems are essentially equivalent for the formulation of the general laws of nature*" (or similar statement), but at present it still be used in many textbooks!

Here we present an example to show that *all coordinate systems are not essentially equivalent for the formulation of the general laws of nature*.

As well-known, the fractal distribution reads

$$N = \frac{C}{r^D}$$

The fractal distribution is a straight line only in the double logarithmic coordinates. Therefore, if some law of nature conforms to the fractal distribution rule, then the law that "the change of this natural phenomenon conforms to the linear rule" is only correct in the double logarithmic coordinates.

Why does any symmetry will be violated? The essential reason is that there is no absolute truth. Any physical law is only partially and temporarily correct.

2 Symmetry given by Noether's theorem

Noether's theorem states that each continuous symmetry of a physical system implies that some physical property of that system is conserved. Conversely, each conserved quantity has a corresponding symmetry.

Accordingly, we can say that theoretically, any equation in natural sciences and social sciences is corresponding to a symmetry and the related conserved quantity, and this conserved quantity can be equal to an arbitrary constant.

For example, the law of gravity reads

$$F = \frac{GMm}{r^2} \tag{1}$$

It can be written as the form that the conserved quantity is equal to 0

$$f_0(M,m,r) = F - \frac{GMm}{r^2} = 0 \tag{2}$$

Or the form that the conserved quantity is equal to 1

$$f_1(M,m,r) = F - \frac{GMm}{r^2} + 1 = 1 \tag{3}$$

And the form that the conserved quantity is equal to an arbitrary constant A

$$f_A(M,m,r) = F - \frac{GMm}{r^2} + A = A \tag{4}$$

Here, $f_A(M,m,r)$ is the symmetry transformation for law of gravity, the corresponding symmetry is the symmetry for law of gravity, and the related conserved quantity is equal to an arbitrary constant A.

However, generally for the sake of convenience, the arbitrary constant A could be equal to 0, namely the form of Eq.(2) will be applied.

Similarly, we can establish the symmetry transformation for the field equations of general relativity, and the corresponding symmetry is the symmetry for general relativity.

Theoretically, for any equation (or equations) in natural sciences and social sciences, we can do the same operation.

3 Contradiction and incompatibility between symmetries

Now we will present the examples to show the contradiction and incompatibility between symmetries.

For example, the incompatibility is existed between the symmetry for law of gravity and the symmetry for general relativity; this is obvious, because the former does not comply with the principle of general relativity, and the latter complies with the principle of general relativity.

Another example is that the law of conservation of energy generated by time translation symmetry is contradicted with the law of conservation of momentum generated by space translation symmetry and the law of conservation of angular momentum generated by space rotation symmetry.

For this problem, see the discussion in references [3].

4 Theoretically the unique symmetry in physics that is strictly correct

As already noted, there is no strict symmetry in nature, therefore the symmetry for law of conservation of energy cannot be the exception.

The prerequisite of law of conservation of energy is the existance of a closed system, but the strictly closed system does not exist, there are only approximately closed systems. Therefore, the symmetry for law of conservation is only approximately correct.

Although the symmetry for law of conservation of energy is only approximately correct, theoretically it could be considered as the unique symmetry in physics that is strictly correct. For other symmetries, they are correct only in the cases that they are not contradicted with this unique symmetry or they can be derived by this unique symmetry.

In reference [3], the examples deriving the improved Newton's second law and improved law of gravity according to law of conservation of energy are discussed. Namely deriving the symmetry for improved Newton's second law and symmetry for improved law of gravity according to the symmetry for law of conservation of energy.

5 Conclusions

Symmetry is an important concept in physics. this paper presents the following viewpoint: There is no strict symmetry in nature, only approximate symmetry and partial and temporary symmetry can exixt; and for any symmetry, we can find the example of violation of symmetry or broken symmetry. The contradiction and incompatibility between symmetries are also discussed. Finally we point out that, although the symmetry for law of conservation of energy is only approximately correct, theoretically it could be considered as the unique symmetry in physics that is strictly correct. For other symmetries, they are correct only in the cases that they are not contradicted with this unique symmetry or they can be derived by this unique symmetry. Furthermore, for the symmetry for law of conservation of energy, there are many problems to be discussed. These show the great potentiality of the symmetry for law of conservation of energy, and giving full play to the role of the symmetry for law of conservation of energy will completely change the situation of physics. In addition, in a more wide range, the symmetry for law of conservation of energy can be used to deal with all the problems related to energy in physics, astronomy, mechanics, engineering, chemistry, biology, and the like with a unified way.

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Errors in Nobel Prize for Physics (5)
——Improper Exclusion Principle and Man-made Law

Abstract: One of the reasons for 1945 Nobel Prize for physics is “for the discovery of the Exclusion Principle, also called the Pauli principle”. It has been found that bosons are not subject to the Pauli exclusion principle. This paper argues that in some cases the exclusion principle is also invalid for fermions. The reasons are as follows: first, according to Neutrosophy, any proposition has three situations of truth, falsehood and indeterminacy respectively; second, some scholars have pointed out that the exclusion principle may be broken in high-energy state; third, due to the existance of man created law (man-made law), the broken exclusion principle and the man-made (instantaneous) magnetic monopole can be artificially created; fourth, the exclusion principle is not compatible with law of conservation of energy, and in physics the principles that are not compatible with law of conservation of energy will be invalid in some cases.
Key words: Exclusion principle, error, law of conservation of energy, man created law (man-made law), man-made (instantaneous) magnetic monopole

Introduction

One of the reasons for 1945 Nobel Prize for physics is “for the discovery of the Exclusion Principle, also called the Pauli principle”. However, it has been found that bosons are not subject to the Pauli exclusion principle. Then there is the question: whether or not that in some cases the exclusion principle is also invalid for fermions? This paper tries to discuss this issue from four aspects.

1 According to Neutrosophy, any proposition has three situations of truth, falsehood and indeterminacy respectively

Neutrosophy is a new branch of philosophy that studies the origin, nature, and scope of neutralities, as well as their interactions with different ideational spectra.

This theory considers every notion or idea <A> together with its opposite or negation <Anti-A> and the spectrum of "neutralities" <Neut-A> (i.e. notions or ideas located between the two extremes, supporting neither <A> nor <Anti-A>). The <Neut-A> and <Anti-A> ideas together are referred to as <Non-A>.

Neutrosophy is the base of neutrosophic logic, neutrosophic set, neutrosophic probability and statistics used in engineering applications (especially for software and information fusion), medicine, military, cybernetics, and physics.

Neutrosophic Logic is a general framework for unification of many existing logics, such as fuzzy logic (especially intuitionistic fuzzy logic), paraconsistent logic, intuitionistic

logic, etc. The main idea of NL is to characterize each logical statement in a 3D Neutrosophic Space, where each dimension of the space represents respectively the truth (T), the falsehood (F), and the indeterminacy (I) of the statement under consideration, where T, I, F are standard or non-standard real subsets of]-0, 1+[without necessarily connection between them.

More information about Neutrosophy may be found in references [1,2].

Because the exclusion principle is invalid for bosons, the viewpoint of Neutrosophy that "any proposition is falsehood in some cases" has been vindicated.

Similarly, according to the viewpoint of Neutrosophy, the exclusion principle also should have three situations of truth, falsehood and indeterminacy respectively for fermions.

2 Some scholars have pointed out that the exclusion principle may be broken in high-energy state

It is well known that some scholars have doubted the validity of exclusion principle.

For example, in reference [3], it presents that for high-energy celestial bodies such as neutron stars and the like, the broken Pauli exclusion principle will be observed; and points out that the exclusion principle may be broken in high-energy state.

3 The broken exclusion principle and the man-made (instantaneous) magnetic monopole can be artificially created

The conventional viewpoint considers that man cannot create law. This is a one-sided viewpoint. In some cases, man can create law, including change the rule into law. So the laws can be divided into at least three kinds: the objective law, the man created subjective law, as well as the synthetic law formed by the above mentioned two kinds of laws.

Now we discuss various man created laws (man-made laws).

In the social science: (1)in stock market the banker created the law of stock, (2)for various goods,the wholesale price calculation formula is decided by the owner, (3) the laws of Chinese new year firecrackers and the Mid-Autumn Festival cake.

In the natural science: (1)the law of gravity and the theory of general relativity were created by Newton and Einstein respectively, (2)some geometries built from a set of axioms, (3)various carry-systems in mathematics, (4)the operation of fountain with man created law, (5)the temperature law of the greenhouse.

In thinking science: one divides into two or one divides into three (such as the three worlds) and one divides into five (such as the five elements in Chinese ancient times), and the different laws to learn the knowledge such as the sequence of easy-difficult or difficult-easy.

In the virtual world (the laws don't need to be tested by practice): (1)in science fiction the Hubble constant can be given arbitrarily as well as the speed of airship can reach ten thousand times of the speed of light, (2)in the ancient Chinese novel “The Pilgrimage to the West”, Tang Monk’s law to punish the Monkey King, (3)in artistic works the law of the hero and the beauty, (4)the law to steal vegetables from the online game.

Finally the optimum synthetic law formed by subjective law and objective law, such as Earth's best seasonal variation, can be created by people.

In physics, the man-made laws have not been paid enough attention. However, some scholars have presented some issues connected with man-made laws. For example, some scholars say that "magnetic monopole" can exist. "magnetic monopole can exist" is a man-made law, because in nature "magnetic monopole" does not exist.

Now, we give an artificial method to create "man-made (instantaneous) magnetic monopole".

Suppose there is a long uniform rectangular-shaped magnet, along its middle section (the demarcation section of N-pole and S-pole) to cut it at very high speed, as the disconnected instant moment, one half of the magnet is the pure N-pole, and the other half is the pure S-pole.

Due to the existence of man-made laws, especially the "man-made (instantaneous) magnetic monopole" can be created as above mentioned, we can say that the broken exclusion principle can be artificially created for fermions.

4 The exclusion principle is not compatible with law of conservation of energy, and in physics the principles that are not compatible with law of conservation of energy will be invalid in some cases

Firstly the exclusion principle can be written as a symmetry form.

In order to connect the exclusion principle with a conserved quantity, supposing "1" (or any other constant) denote “valid”, and "does not equal 1" denote “invalid”, in this way the exclusion principle (denoted as P) can be written as the following form of conserved quantity

$$P=1$$

According to Noether's theorem, each continuous symmetry of a physical system implies that some physical property of that system is conserved. Conversely, each conserved quantity has a corresponding symmetry.

In reference [4] we already point out that for any symmetry, we can find the example of violation of symmetry or broken symmetry. As a kind of symmetry, the exclusion principle (P=1) cannot make an exception. As for the reason, in reference [4] we point out: there is no strict symmetry in nature. For example, the symmetry for law of conservation of energy cannot be the exception.

The prerequisite of law of conservation of energy is the existance of a closed system, but the strictly closed system does not exist, there are only approximately closed systems. Therefore, the symmetry for law of conservation is only approximately correct.

Although the symmetry for law of conservation of energy is only approximately correct, theoretically it could be considered as the unique symmetry in physics that is strictly correct. For other symmetries, they are correct only in the cases that they are not contradicted with this unique symmetry or they can be derived by this unique symmetry.

In reference [5], the examples deriving the improved Newton's second law and improved law of gravity according to law of conservation of energy are discussed. Namely deriving the symmetry for improved Newton's second law and symmetry for improved law of gravity according to the symmetry for law of conservation of energy.

In reference [5] we also point out: besides law of conservation of energy, all other laws of conservation in physics may not be correct (or their probabilities of correctness are

all less than 100%). In reference [5] we also discuss the examples that law of conservation of momentum and law of conservation of angular momentum are not correct (their results are contradicted with law of conservation of energy).

The essential reason for the exclusion principle may be invalid is that it does not take into account the law of conservation of energy, and in physics the principles that are not compatible with law of conservation of energy will be invalid in some cases

5 Conclusions

For the reason that the exclusion principle may be invalid for fermions, we can reach the following conclusions: In physics, the law of conservation of energy is the unique truth; for other principles, laws and the like, as they are established, the law of conservation of energy should be considered, otherwise they may be invalid in some cases; for many existing principles, laws and the like that do not consider the law of conservation of energy, we should renewly consider their relationship with the law of conservation of energy, in order to determine their fate or discuss the problems to modify them.

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Chapter 15: Errors in Nobel Prize for Physics (6) ——Improper Heisenberg Uncertainty Principle

Errors in Nobel Prize for Physics (6)

——Improper Heisenberg Uncertainty Principle

Abstract: One of the reasons for 1932 Nobel Prize for physics is “for the creation of quantum mechanics”. As well-known, the most famous contribution of Heisenberg is uncertainty principle, therefore one of the most importment reasons for Heisenberg was

awarded the Nobel Prize is the creation of uncertainty principle. While, this paper points out that the original uncertainty principle is improper. Considering all the possible situations (including the case that people can create laws), the author presents "certainty-uncertainty principles" with general form and variable dimension fractal form. According to the classification of Neutrosophy, "certainty-uncertainty principles" can be divided into three principles in different conditions: "certainty principle", namely a particle's position and momentum can be known simultaneously; "uncertainty principle", namely a particle's position and momentum cannot be known simultaneously; and neutral (fuzzy) "indeterminacy principle", namely whether or not a particle's position and momentum can be known simultaneously is undetermined. The special cases of "certainty-uncertainty principles" include the original uncertainty principle and Ozawa inequality. In addition, in accordance with the original uncertainty principle, discussing high-speed particle's speed and track with Newton mechanics is unreasonable; but according to "certainty-uncertainty principles", Newton mechanics can be used to discuss the problem of gravitational defection of a photon orbit around the Sun (it gives the same result of deflection angle as given by general relativity). Finally, for the reason that in physics the principles, laws and the like that are regardless of the principle (law) of conservation of energy may be invalid; therefore "certainty-uncertainty principles" should be restricted (or constrained) by principle (law) of conservation of energy, and thus it can satisfy the principle (law) of conservation of energy.
Key words: Uncertainty principle, certainty-uncertainty principles, fractal, variable dimension fractal, Ozawa inequality, principle (law) of conservation of energy

Introduction

In quantum mechanics, the uncertainty principle refers to the position and momentum of a particle cannot be determined simultaneously, the uncertainty of position (Δx) and uncertainty of momentum (Δp) obey the following inequality

$$\Delta x \Delta p \geq h/4\pi \qquad (1)$$

where, h is the Planck constant.

One of the reasons for 1932 Nobel Prize for physics is "for the creation of quantum mechanics". As well-known, the most famous contribution of Heisenberg is uncertainty principle, therefore one of the most importment reasons for Heisenberg was awarded the Nobel Prize is the creation of uncertainty principle. While, this paper points out that the original uncertainty principle is improper.

1 Heisenberg inequality, Ozawa inequality and their forms of equality

Heisenberg inequality (Eq.1) can be changed into the following form of equality

$$\Delta x \Delta p = kh/4\pi \qquad (2)$$

where, k is a real number and $k \geq 1$.

Ozawa inequality [1] can be written as follows

$$\Delta Q \Delta P + \Delta Q \sigma(P) + \sigma(Q) \Delta P \geq h/4\pi \qquad (3)$$

It can be changed into the following form of equality

$$\Delta Q\Delta P + \Delta Q\sigma(P) + \sigma(Q)\Delta P = kh/4\pi \qquad (4)$$

where, k is a real number and $k \geq 1$.

2 "Certainty-uncertainty principles" with general form

Neutrosophy is proposed by Prof. Florentin Smarandache in 1995.

Neutrosophy is a new branch of philosophy that studies the origin, nature, and scope of neutralities, as well as their interactions with different ideational spectra.

This theory considers every notion or idea <A> together with its opposite or negation <Anti-A> and the spectrum of "neutralities" <Neut-A> (i.e. notions or ideas located between the two extremes, supporting neither <A> nor <Anti-A>). The <Neut-A> and <Anti-A> ideas together are referred to as <Non-A>.

Neutrosophy is the base of neutrosophic logic, neutrosophic set, neutrosophic probability and statistics used in engineering applications (especially for software and information fusion), medicine, military, cybernetics, and physics.

Neutrosophic Logic is a general framework for unification of many existing logics, such as fuzzy logic (especially intuitionistic fuzzy logic), paraconsistent logic, intuitionistic logic, etc. The main idea of NL is to characterize each logical statement in a 3D Neutrosophic Space, where each dimension of the space represents respectively the truth (T), the falsehood (F), and the indeterminacy (I) of the statement under consideration, where T, I, F are standard or non-standard real subsets of]-0, 1+[without necessarily connection between them.

More information about Neutrosophy may be found in references [2, 3].

According to Neutrosophy, the original uncertainty principle can be extended into the following "certainty-uncertainty principles" with general form

$$\Delta x\Delta p = Kh \qquad (5)$$

where, K is a real number and $K > 0$.

Eq.(5) can be divided into three principles:

The first one is the “uncertainty principle” ($K \geq K_1$): a particle’s position and momentum cannot be known simultaneously.

Obviously, if $K_1 = 1/4\pi$, then it is the original uncertainty principle.

The second one is the “certainty principle” ($K \leq K_2$): a particle’s position and momentum can be known simultaneously.

Referring to the experiments for establishing Ozawa inequality, the value of K_2 can be decided by related experiments.

The third one is the neutral (fuzzy) “indeterminacy principle" ($K_2 < K < K_1$): whether or not a particle’s position and momentum can be known simultaneously is undetermined.

Similarly, the original Ozawa inequality can be extended into the following Ozawa type's "certainty-uncertainty principles" with general form

$$\Delta Q\Delta P+\Delta Q\sigma(P)+\sigma(Q)\Delta P=Kh \qquad (6)$$

where, K is a real number and $K>0$.

Eq.(6) can be divided into three principles:

The first one is the "certainty principle" ($K\geq K_1$): a particle's position and momentum can be known (namely can be measured with zero-error) simultaneously (here σ(*P*) or σ(*Q*) is equal to infinity).

Obviously, if $K_1=1/4\pi$, then it is the original Ozawa inequality (with equality form).

It should be noted that here the first one is not the uncertainty principle, but certainty principle.

The second one is the "uncertainty principle" ($K\leq K_2$): a particle's position and momentum cannot be known simultaneously.

The third one is the neutral (fuzzy) "indeterminacy principle" ($K_2<K<K_1$): whether or not a particle's position and momentum can be known simultaneously is undetermined.

3 "Certainty-uncertainty principles" with variable dimension fractal form

In order to process Eq. (5) and Eq.(6), as well as other equalities and inequalities that may arise in the future with unified manner, we will discuss the "certainty-uncertainty principles" with variable dimension fractal form.

The general form of variable dimension fractal is as follows

$$N=\frac{C}{r^D} \qquad (7)$$

where, $D=f(r)$, instead of a constant.

For the sake of convenience, we only discuss the situation of $C=1$, that is

$$N=\frac{1}{r^D} \qquad (8)$$

Thus, Eq.(5) can be written as the following variable dimension fractal form

$$\Delta x\Delta p=\frac{1}{h^D} \qquad (9)$$

Solving this equation, it gives

$$D=-\frac{\ln(Kh)}{\ln h} \qquad (10)$$

Then, the values of D_1 and D_2 corresponding to K_1 and K_2 can be calculated by Eq.(10), for example

$$D_1=-\frac{\ln(K_1h)}{\ln h} \qquad (11)$$

Similarly, Eq.(6) can be written as the following variable dimension fractal form

$$\Delta Q \Delta P = \frac{1}{h^D} \qquad (12)$$

Solving this equation, it gives

$$D = -\frac{\ln(Kh - \Delta Q\sigma(P) - \sigma(Q)\Delta P)}{\ln h} \qquad (13)$$

Then, the values of D_1 and D_2 corresponding to K_1 and K_2 can be calculated by Eq.(13), for example

$$D_1 = -\frac{\ln(K_1 h - \Delta Q\sigma(P) - \sigma(Q)\Delta P)}{\ln h} \qquad (14)$$

4 Solving the problem of light speed with Newton mechanics

In accordance with the original uncertainty principle, discussing high-speed particle's speed and track with Newton mechanics is unreasonable; but according to "certainty-uncertainty principles", Newton mechanics can be used to discuss the problem of gravitational defection of a photon orbit around the Sun (it presents the same result of deflection angle as given by general relativity). The solving method can be found in reference [4]; in which, for problem of gravitational defection of a photon orbit around the Sun, the improved formula of gravitation between Sun and photon is as follows:

$$F = -\frac{GMm}{r^2} - \frac{1.5GMm_0^2}{r^4} \qquad (15)$$

where: r_0 is the shortest distance between the light and the Sun, if the light and the Sun are tangent, it is equal to the radius of the Sun.

The funny thing is that, for this problem, the maximum gravitational force given by the improved formula is 2.5 times of that given by the original Newton's law of gravity.

5 To be restricted (or constrained) by principle (law) of conservation of energy

For the reason that in physics the principles, laws and the like that are regardless of the principle (law) of conservation of energy may be invalid; therefore "certainty-uncertainty principles" should be restricted (or constrained) by principle (law) of conservation of energy, and thus it can satisfy the principle (law) of conservation of energy.

The general form of the principle (law) of conservation of energy is as follows

$$E(t) = E(0) = cons$$

or

$$1 - \frac{E(t)}{E(0)} = 0$$

Thus, referring to reference [3] for applying least square method to establish "partial

and temporary unified theory of natural science so far" including all the equations of natural science so far (in which, the theory of everything to express all of natural laws, described by Hawking that a single equation could be written on a T-shirt, is partially and temporarily realized in the form of "partial and temporary unified variational principle of natural science so far"), Eq.(5) (one kind of "certainty-uncertainty principles" with general form) can be restricted (or constrained) by principle (law) of conservation of energy as follows

$$\Delta x\Delta p - Kh)^2 + w(1-\frac{E(t)}{E(0)})^2 = 0 \qquad (16)$$

where, K is a real number and $K > 0$, w is a suitable positive weighted number.

Similarly, Eq.(6) (one kind of Ozawa type's "certainty-uncertainty principles" with general form) can be restricted (or constrained) by principle (law) of conservation of energy as follows

$$\Delta Q\Delta P + \Delta Q\sigma(P) + \sigma(Q)\Delta P - Kh)^2 + w(1-\frac{E(t)}{E(0)})^2 = 0 \qquad (17)$$

For Eq.(9) (the variable dimension fractal form of Eq.(5)), it can be restricted (or constrained) by principle (law) of conservation of energy as follows

$$\Delta x\Delta p - \frac{1}{h^D})^2 + w(1-\frac{E(t)}{E(0)})^2 = 0 \qquad (18)$$

For Eq.(12) (the variable dimension fractal form of Eq.(6)), it can be restricted (or constrained) by principle (law) of conservation of energy as follows

$$\Delta Q\Delta P - \frac{1}{h^D})^2 + w(1-\frac{E(t)}{E(0)})^2 = 0 \qquad (19)$$

As the cases that "certainty-uncertainty principles" should be restricted (or constrained) by other principles (laws) and the like, similar method can be used.

6 Conclusions

The original uncertainty principle is improper. Considering all the possible situations (including the case that people can create laws), the author presents "certainty-uncertainty principles" with general form and variable dimension fractal form. According to the classification of Neutrosophy, "certainty-uncertainty principles" can be divided into three principles in different conditions: "certainty principle", namely a particle's position and momentum can be known simultaneously; "uncertainty principle", namely a particle's position and momentum cannot be known simultaneously; and neutral (fuzzy) "indeterminacy principle", namely whether or not a particle's position and momentum can be known simultaneously is undetermined.

Referring to the "certainty-uncertainty principles" for a particle's position and momentum, the "certainty-uncertainty principles" for other physical quantities can also be presented with the similar method.

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Chapter 16: Errors in Nobel Prize for Physics (7) ——Improper Schrodinger Equation and Dirac Equation

Errors in Nobel Prize for Physics (7)

—Improper Schrodinger Equation and Dirac Equation

Abstract: One of the reasons for 1933 Nobel Prize for physics is "for the discovery of new productive forms of atomic theory" (namely Schrodinger equation and Dirac equation). While, this paper points out that Schrodinger equation and Dirac equation are improper. According to Neutrosophy, Schrodinger equation and Dirac equation have three situations of truth, falsehood and indeterminacy respectively. Three reasons lead to Schrodinger equation and Dirac equation are improper: firstly, they are not derived by the principle of conservation of energy; secondly, the random (stochastic) concept could lead to absurd results; thirdly, they cannot solve many problems such as gravitation. Applying "partial and temporary unified theory of natural science so far" including all the equations of natural science so far (in which, the theory of everything to express all of natural laws, described by Hawking that a single equation could be written on a T-shirt, is partially and temporarily realized in the form of "partial and temporary unified variational principle of natural science so far"), this paper presents "partial and temporary unified theory of quantum mechanics so far", this unified theory can be used to make Schrodinger equation and Dirac equation tend to be proper (making Schrodinger equation and Dirac equation are restricted (or constrained) by principle of conservation of energy, and thus they can satisfy the principle of conservation of energy; also making they are restricted (or constrained) by a certain gravitational theory, and establish "partial and temporary unified theory of quantum-gravitation so far").
Key words: Schrodinger equation, Dirac equation, improper, principle of conservation of energy, partial and temporary unified theory of natural science so far, partial and temporary unified theory of quantum mechanics so far, partial and temporary unified

theory of quantum-gravitation so far

Introduction

In quantum mechanics, Schrodinger equation and Dirac equation are two very important basic equations. One of the reasons for 1933 Nobel Prize for physics is “for the discovery of new productive forms of atomic theory” (namely Schrodinger equation and Dirac equation). While, this paper points out that Schrodinger equation and Dirac equation are improper.

According to Neutrosophy (more information about Neutrosophy may be found in references [1, 2]), all propositions (including Schrodinger equation and Dirac equation) have three situations of truth, falsehood and indeterminacy respectively. In which the situations of falsehood and indeterminacy lead to that Schrodinger equation and Dirac equation are improper.

Applying "partial and temporary unified theory of natural science so far" including all the equations of natural science so far (in which, the theory of everything to express all of natural laws, described by Hawking that a single equation could be written on a T-shirt, is partially and temporarily realized in the form of "partial and temporary unified variational principle of natural science so far"), we can make Schrodinger equation and Dirac equation tend to be proper.

1 Schrodinger equation and Dirac equation are improper

Firstly, Schrodinger equation and Dirac equation are not derived by the principle of conservation of energy.

As well-known, Schrodinger Equation is actually a basic assumption of quantum mechanics, people can only rely on experiments to test its correctness. While in physics the principles, laws, equations and the like that do not consider the principle of conservation of energy will be invalid in some cases.

In some aspect, the function of Schrodinger Equation is equivalent to Newton’s second law. However in reference [3], through the example of free falling body, we derive the original Newton's second law by using the law of conservation of energy, and prove that there is not the contradiction between the original law of gravity and the law of conservation of energy; and through the example of a small ball rolls along the inclined plane (belonging to the problem cannot be solved by general relativity that a body is forced to move in flat space), derive improved Newton's second law and improved law of gravity by using law of conservation of energy.

How to derive Schrodinger Equation with the law of conservation of energy, is a topic for further research.

For the reason that the Dirac equation is complying with the principles of special relativity and quantum mechanics simultaneously, and it is the Lorentz covariant form of Schrodinger Equation; therefore, the Dirac equation is not derived by the principle of conservation of energy also.

In addition, we already point out the shortcomings of special relativity in reference [4], so the Dirac equation inevitably has the defects caused by special relativity.

Secondly, the random (stochastic) concept could lead to absurd results.

The random (stochastic) results given by Schrodinger equation and Dirac equation have been opposed and criticized by many scholars. Here we present some absurd results caused by the random (stochastic) concept of Schrodinger equation and Dirac equation.

According to the Schrodinger equation and Dirac equation, when the particle is in a certain state, its mechanical quantities (such as coordinates, momentum, angular momentum, energy, etc) generally do not have a definite value, and have a series of possible values, each possible value is appeared with a certain probability. In accordance with this random (stochastic) concept, the mass of microscopic particle such as electron, proton and neutron, should also generally do not have a definite value! And the number of electron, proton and neutron contained by the atom of each element should also generally do not have a definite value! Particularly, the ratio of proton mass to electron mass should also generally do not have a definite value (instead of 1836.1527)!

Thirdly, they cannot solve many problems such as gravitation.

Not only Schrodinger equation and Dirac equation cannot be used to solve the gravitational problem, but also they cannot be used to solve many problems of microscopic particles. For example, they cannot give that the ratio of proton mass to electron mass is equal to 1836.1527. Another example is that they cannot give the shielding distance in plasma problem, the Debye distance formula must be applied.

2 Making Schrodinger equation and Dirac equation tend to be proper

2.1 Partial and temporary unified variational principle of natural science so far

In reference [2], for any field, least square method can be used to establish this field's "partial and temporary unified theory so far" (the corresponding expression is "partial and temporary unified variational principle so far").

Supposing that for a certain domain Ω, we already establish the following general equations

$$F_i = 0 \qquad (i = 1,2 \to n) \tag{1}$$

On boundary V, the boundary conditions are as follows

$$B_j = 0 \qquad (j = 1,2 \to m) \tag{2}$$

Applying least square method, for this field and the domains and boundary conditions the "partial and temporary unified theory so far" can be expressed in the following form of "partial and temporary unified variational principle so far"

$$\Pi = \sum_1^n W_i \int_\Omega F_i^2 d\Omega + \sum_1^m W_j' \int_V B_j^2 dV = \min_0 \tag{3}$$

where: $\min_0$ was introduced in reference [5], indicating the minimum and its value should be equal to zero. W_i and W_j' are suitable positive weighted constants; for the simplest cases, all of these weighted constants can be taken as 1. If only a certain equation is considered, we can only make its corresponding weighted constant is equal to

1 and the other weighted constants are all equal to 0.

By using this method, we already established the "partial and temporary unified water gravity wave theory so far" and the corresponding "partial and temporary unified water gravity wave variational principle so far", in reference [6]; and established the "partial and temporary unified theory of fluid mechanics so far" and the corresponding "partial and temporary unified variational principle of fluid mechanics so far" in reference [7].

Some scholars may said, this is simply the application of least square method, our answer is that: the simplest way may be the most effective way.

It should be noted that, in past time, due to we cannot realize that the strict "unified theory" cannot be existed, therefore in references [6] and [7], the wrong ideas that "unified water gravity wave theory", "unified water gravity wave variational principle", "unified theory of fluid mechanics" and "unified variational principle of fluid mechanics" were appeared. Now we correct these mistakes in this paper.

It should also be noted that, Eq.(2) can be included in Eq.(1), therefore we will only discuss Eq.(1), rather than discuss Eq.(2).

In reference [2], for unified dealing with the problems of natural science, applying least square method, "partial and temporary unified theory of natural science so far" can be expressed in the following form of "partial and temporary unified variational principle of natural science so far"

$$\Pi_{\mathrm{NATURE}} = \sum_{1}^{n} W_i \int_{\Omega_i} F_i^2 d\Omega_i + \sum_{1}^{m} W_j' S_j^2 = \min_0 \qquad (4)$$

where: the subscript NATURE denotes that the suitable scope is all of the problems of natural science, all of the equations $F_i = 0$ denote so far discovered (derived) all of the equations related to natural science, all of the equations $S_i = 0$ denote so far discovered (derived) all of the solitary equations related to natural science (for example, the coefficient in the Coulomb's law can be written as the following solitary equation: $S_1 = 0$, where, $S_1 = k - 9.0\times10^9 \mathrm{N\cdot m^2/C^2}$), and W_i and W_j' are suitable positive weighted constants.

In this way, the theory of everything to express all of natural laws, described by Hawking that a single equation could be written on a T-shirt, is partially and temporarily realized in the form of "partial and temporary unified variational principle of natural science so far".

2.2 Partial and temporary unified theory of quantum mechanics so far

Now we apply the unified variational principle to make Schrodinger equation and Dirac equation tend to be proper.

The Schrodinger equation can be written as follows

$$H\psi = i\hbar \frac{\partial}{\partial t}\psi \qquad (5)$$

where, H is the Hamiltonian operator, ψ is the wave function, and $\hbar$ is the reduced Planck constant.

The Dirac equation can be written as follows

$$\frac{1}{i}\gamma^{\mu}\partial_{\mu}\psi + m\psi = 0 \qquad (6)$$

Referring to "partial and temporary unified variational principle of natural science so far" (namely Eq.(4)), applying least square method, "partial and temporary unified theory of quantum mechanics so far" can be expressed in the following form of "partial and temporary unified variational principle of quantum mechanics so far"

$$\Pi_{\mathrm{QM}} = \sum_{1}^{n} W_i \int_{\Omega_i} F_i^2 d\Omega_i + \sum_{1}^{m} W_j' S_j^2 + \Pi_{\mathrm{OTHER}} = \min_0 \qquad (7)$$

where: the subscript QM denotes that the suitable scope is all of the problems of quantum mechanics, all of the equations $F_i = 0$ denote so far discovered (derived) all of the equations related to quantum mechanics, all of the equations $S_i = 0$ denote so far discovered (derived) all of the solitary equations related to quantum mechanics (for example, the ratio of proton mass to electron mass can be written as the following solitary equation: $S_1 = 0$, where, $S_1 = m_{\mathrm{p}} / m_{\mathrm{e}} - 1836.1527$), W_i and W_j' are suitable positive weighted constants, and Π_{OTHER} denote all the functionals established by the principles, laws, formulas and the like that are not included in quantum mechanics (they can be included in the fields of mathematics, chemistry and the like, and we will establish this kind of functionals with the principle of conservation of energy and some gravitational theories).

For example, according to Schrodinger equation, it can give

$$F_1 = H\psi - i\hbar\frac{\partial}{\partial t}\psi \qquad (8)$$

According to Dirac equation, it can give

$$F_2 = \frac{1}{i}\gamma^{\mu}\partial_{\mu}\psi + m\psi \qquad (9)$$

As substituting this form of Dirac equation into Eq.(7), we should refer to the manner to deal with Maxwell's equations for establishing "partial and temporary unified electromagnetic theory so far" in reference [2].

It should be noted that, as dealing with the equations related to quantum mechanics in Eq.(7), If only Schrodinger equation is applied, we can only make its corresponding weighted constant $W_1 = 1$, and the other weighted constants $W_i = 0$; and if only Dirac

equation is applied, we can only make its corresponding weighted constant $W_2 = 1$, and the other weighted constants $W_i = 0$.

Now we establish functional Π_{OTHER} with principle of conservation of energy.

The general form of principle of conservation of energy is as follows

$$E(t) = E(0) = cons$$

Or

$$1 - \frac{E(t)}{E(0)} = 0 \qquad (10)$$

According to above expression, we can establish the following functional

$$\Pi_{\text{OTHER}} = w \int_{t_1}^{t_2} (1 - \frac{E(t)}{E(0)})^2 dt \qquad (11)$$

where, w is a positive weighted constant.

Or another form of the functional

$$\Pi_{\text{OTHER}} = w(1 - \frac{E(t)}{E(0)})^2 \qquad (12)$$

Substituting Eq.(11) or Eq.(12) into Eq.(7), we will make Schrodinger equation and Dirac equation (and other equations) are restricted (or constrained) by principle of conservation of energy, and thus they can satisfy the principle of conservation of energy.

2.3 Partial and temporary unified theory of quantum-gravitation so far

As establishing "partial and temporary unified theory of quantum-gravitation so far", firstly we should establish "partial and temporary unified theory of quantum mechanics so far" (namely Eq.(7)) and "partial and temporary unified gravitational theory so far" respectively, then these two unified theories can be combined together (it is equivalent that one unified theory is restricted (or constrained) by another unified theory).

In reference [2], we already point out that, applying least square method, "partial and temporary unified gravitational theory so far" can be expressed in the following form of "partial and temporary unified gravitational variational principle so far".

$$\Pi_{\text{GRAVITY}} = \sum_1^n W_i \int_{\Omega_i} F_i^2 d\Omega_i + \sum_1^m W_j' S_j^2 = \min \qquad (13)$$

where: the subscript GRAVITY denotes that the suitable scope is the gravity, all of the equations $F_i = 0$ denote so far discovered (derived) all of the equations related to gravity, all of the equations $S_i = 0$ denote so far discovered (derived) all of the solitary equations related to gravity, and W_i and W_j' are suitable positive weighted constants.

According to Eq.(7) and Eq.(13), and they should be restricted (or constrained) by principle of conservation of energy, therefore "partial and temporary unified theory of quantum-gravitation so far" can be expressed in the following form of "partial and temporary unified variational principle of quantum-gravitation so far".

$$\Pi_{\text{QM-GRAVITY}} = \Pi_{\text{QM}} + \Pi_{\text{GRAVITY}} + \Pi_{\text{OTHER}} \qquad (14)$$

where: according to Eq.(11), $\Pi_{\text{OTHER}} = w\int_{t_1}^{t_2}(1-\frac{E(t)}{E(0)})^2 dt$, the reason for adding this functional is also to consider that they should be restricted (or constrained) by principle of conservation of energy.

Now, according to Schroedinger equation and several theories of gravitation, we will present "the simplest partial and temporary unified theory of quantum-gravitation so far".

Supposing thst a certain theory of gravitation can be written as follows

$$F_{\text{GR}} = 0 \qquad (15)$$

According to Eq.(8), Eq.(15), ang Eq.(11), we can establish the following general form of "the simplest partial and temporary unified theory of quantum-gravitation so far".

$$\Pi_{\text{Q-G}} = W_1\int_{\Omega_1} F_1^2 d\Omega_1 + W_2\int_{\Omega_2} F_{\text{GR}}^2 d\Omega_2 + \Pi_{\text{OTHER}} = \min_0 \qquad (16)$$

where, according to Schroedinger equation Eq.(8): $F_1 = H\psi - i\hbar\frac{\partial}{\partial t}\psi$, according to Eq.(11): $\Pi_{\text{OTHER}} = w\int_{t_1}^{t_2}(1-\frac{E(t)}{E(0)})^2 dt$, and the expression of F_{GR} should be determined by the applied theory of gravitation.

Now we will discuss several concrete theories of gravitation.

Supposing that Newton's theory of gravity is applied, and it can be written as follows

$$F = -\frac{GMn}{r^2}$$

It gives

$$F_{\text{GR}} = F + \frac{GMm}{r^2} \qquad (17)$$

Supposing that the improved Newton's formula of universal gravitation presented in reference [2] is applied (this formula can give the same results as given by general relativity for the problem of planetary advance of perihelion and the problem of gravitational defection of a photon orbit around the Sun), and it can be written as follows

$$F = -\frac{GMm}{r^2} - \frac{3G^2M^2mp}{c^2r^4}$$

It gives

$$F_{\text{GR}} = F + \frac{GMm}{r^2} + \frac{3G^2M^2mp}{c^2r^4} \qquad (18)$$

Supposing that the more accurate gravitational formula presented in reference [2, 3] is applied (as solving the problem of gravitational defection of a photon orbit around the Sun with this formula, the result of deflection angle is exactly the same as given by precise astronomical observation, while the results given by general relativity and the improved Newton's formula of universal gravitation have still slight deviations with the precise astronomical observation), and it can be written as follows

$$F = -\frac{GMm}{r^2}(1+\frac{3GMp}{c^2r^2}+\frac{wG^2M^2p^2}{c^4r^4})$$

It gives

$$F_{\mathrm{GR}} = F+\frac{GMm}{r^2}(1+\frac{3GMp}{c^2r^2}+\frac{wG^2M^2p^2}{c^4r^4}) \qquad (19)$$

Supposing that Einstein's gravitational field equations is applied, and it can be written as follows

$$R_{ab}-\frac{1}{2}Rg_{ab}=\kappa T_{ab}$$

It gives

$$F_{\mathrm{GR}} = R_{ab}-\frac{1}{2}Rg_{ab}-\kappa T_{ab} \qquad (20)$$

If other theory of gravitation is applied, then other form of F_{GR} can be given.

3 Conclusions

Establishing "partial and temporary unified theory of quantum mechanics so far" and "partial and temporary unified theory of quantum-gravitation so far", can make Schrodinger equation and Dirac equation tend to be proper. Further topic of research should be the application of these partial and temporary unified theories so far.

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Chapter 17: Conclusions

Considering all possible situations, to win the best ending. This is our starting point for establishing New Newton Mechanics and for solving many complicated problems. Practice has proved that this idea is successful.

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