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Neutrosophic Examples in Physics

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Abstract: Neutrosophy can be widely applied in physics and the like. For example, 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 according to neutrosophy, there exist seven or nine states of accelerating expansion and contraction and the neutrosophic state in the universe. Another two examples are "a revision to Gödel's incompleteness theorem by neutrosophy" and "six neutral (neutrosophic) fundamental interactions". In addition, the "partial and temporary unified theory so far" is discussed (including "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").

Keywords: Neutrosophy, application, neutrosophic example, physics, partial and temporary unified theory so far.

1 Introduction

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 [1-4].

Now we discuss the neutrosophic examples in physics and the like.

2 Discussion on "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 according to neutrosophy, "the accelerating expansion of the universe" is debatable.

Supposing that "the expansion of the universe" is an idea <A>, its opposite or negation <Anti-A> should be "the contraction of the universe", and the spectrum of "neutralities" <Neut-A> should be "the stable state of the universe" (i.e. the state located between the two extremes, supporting neither expansion nor contraction).

In fact, the area nearby a black hole is in the state of contraction, because 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.

As for "the stable state of the universe", it should be located at the transition area between expansion area and contraction area.

Again, running the same program to the state of "the expansion of the universe", supposing that "the

accelerating expansion of the universe" is an idea <A>, its opposite or negation <Anti-A> should be "the decelerating expansion of the universe", and the spectrum of "neutralities" <Neut-A> should be "the uniform expansion of the universe" (i.e. the state located between the two extremes, supporting neither accelerating expansion nor decelerating expansion).

Similarly, running the same program to the state of "the contraction of the universe", it can be divided into three cases: "the accelerating contraction of the universe", "the decelerating contraction of the universe", and "the uniform contraction of the universe".

To sum up, there exist seven states in the universe: accelerating expansion, decelerating expansion, uniform expansion, accelerating contraction, decelerating contraction, uniform contraction, and stable state.

In addition, according to neutrosophy, another kind of seven states is as follows: long-term expansion, short-term expansion, medium-term expansion, long-term contraction, short-term contraction, medium-term contraction, and stable state.

It should be noted that, the stable state can be also divided into three cases, such as: "long-term stable state", "short-term stable state", and "medium-term stable state"; thus there exist nine states in the universe.

Considering all possible situations, besides these seven or nine states, due to the limitations of human knowledge, there may be other unknown states.

From this example we can see that, all of the absolute, solitary and one-sided viewpoints are completely wrong. But with the help of neutrosophy, many of these mistakes may be avoided.

3 A revision to Gödel's incompleteness theorem by neutrosophy

According to reference [4], the main contents of the revision are as follows.

As well-known, neutrosophy paves the way to consider all possible situations. But we can see that in the proof of Gödel's incompleteness theorem, all possible situations are not considered.

First, in the proof, the following situation is not considered: wrong results can be deduced from some axioms. For example, from the axiom of choice a paradox, the doubling ball theorem, can be deduced, which says that a ball of volume 1 can be decomposed into pieces and reassembled into two balls both of volume 1. It follows that in certain cases, the proof of Gödel's incompleteness theorem may be faulty.

Second, in the proof of Gödel's incompleteness theorem, only four situations are considered, that is, one proposition can be proved to be true, cannot be proved to be true, can be proved to be false, cannot be proved to be false and their combinations such as one proposition can neither be proved to be true nor be proved to be false. But those are not all possible situations. In fact, there may be many kinds of indeterminate situations, including it can be proved to be true in some cases and cannot be proved to be true in other cases; it can be proved to be false in some cases and cannot be proved to be false in other cases; it can be proved to be true in some cases and can be proved to be false in other cases; it cannot be proved to be true in some cases and cannot be proved to be false in other cases; it can be proved to be true in some cases and can neither be proved to be true, nor be proved to be false in other cases; and so on.

Because so many situations are not considered, we may say that the proof of Gödel's incompleteness theorem is faulty, at least, is not one with all sided considerations.

In order to better understand the case, we consider an extreme situation, where one proposition as shown in Gödel's incompleteness theorem can neither be proved, nor disproved. It may be assumed that this proposition can be proved in 9999 cases, only in 1 case it can neither be proved, nor disproved. We will see whether or not this situation has been considered in the proof of Gödel's incompleteness theorem.

Some people may argue that, this situation is equivalent to the one where the proposition can neither be proved, nor disproved. But the difference lies in the distinction between the part and the whole. If one case may represent the whole situation, many important theories cannot be applied. For example the general theory of relativity involves singular points; the law of universal gravitation does not allow the case where the distance r is equal to zero. Accordingly, whether or not one may say that the general theory of relativity and the law of universal gravitation cannot be applied as a whole? Similarly, the situation also cannot be considered as the one that can be proved. But, this problem may be easily solved with the neutrosophic method.

Moreover, if we apply the Gödel's incompleteness theorem to itself, we may obtain the following possibility: in one of all formal mathematical axiom systems, the Gödel's incompleteness theorem can neither be proved, nor disproved.

If all possible situations can be considered, the Gödel's incompleteness theorem can be improved in principle. But, with our boundless universe being ever changing and being extremely complex, it is impossible "considering all possible situations". As far as "considering all possible situations" is concerned, the Smarandache's neutrosophy is quite good, possibly, the best. Therefore this paper proposes to revise the Gödel's incompleteness theorem into the incomplete axiom with Smarandache's neutrosophy.

Considering all possible situations with Smarandache's neutrosophy, one may revise the Gödel's Incompleteness theorem into the incompleteness axiom: Any proposition in

any formal mathematical axiom system will represent, 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+[.

4 Six neutral (neutrosophic) fundamental interactions

As well-known, according to the present understanding, there are four fundamental interactions or forces: gravitational, electromagnetic, weak and strong interaction.

While, in accordance with the neutrosophy theory that between an entity and its opposite there exist intermediate entities, thus besides the existing four fundamental interactions there must exist six neutral (neutrosophic) fundamental interactions (as six new forms of fundamental interaction). For example, between strong interaction and weak interaction there exists intermediate interaction, namely neutral (neutrosophic) strong-weak fundamental interaction (NSW fundamental interaction), it neither strong interaction nor weak interaction, but something in between. Similarly, considering other five pairs of opposite interactions: strong and electromagnetic fundamental interaction, strong and gravitational fundamental interaction, weak and electromagnetic fundamental interaction, weak and gravitational fundamental interaction, and electromagnetic and gravitational fundamental interaction respectively, other five neutral (neutrosophic) fundamental interactions are as follows: neutral (neutrosophic) strong-electromagnetic fundamental interaction (NSE fundamental interaction), neutral (neutrosophic) strong-gravitational fundamental interaction (NSG fundamental interaction), neutral (neutrosophic) weak-electromagnetic fundamental interaction (NWE fundamental interaction), neutral (neutrosophic) weak-gravitational fundamental interaction (NWG fundamental interaction) and neutral (neutrosophic) electromagnetic-gravitational fundamental interaction (NEG fundamental interaction).

Thus, there may be ten fundamental interactions all together.

5 Several unified theories

Whether or not the unified theory can be existed? According to neutrosophy, there are three cases as follows: the unified theory can be existed, the unified theory cannot be existed, and the neutrosophic case (such as the "partial and temporary unified theory so far").

Now we discuss the "partial and temporary unified theory so far" .

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.

5.1 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

$$F_i = 0 \quad (i = 1,2 \to n) \qquad (1)$$

On boundary V, the boundary conditions are as follows

$$B_j = 0 \quad (j = 1,2 \to m) \qquad (2)$$

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"

$$\Pi = \sum_1^n W_i \int_\Omega F_i^2 d\Omega + \sum_1^m W_j' \int_V B_j^2 dV = \min_0 \quad (3)$$

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: 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 [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).

Now we write Maxwell's equations as follows

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

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

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

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

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

where : $F_3 = \nabla \bullet B$

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

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

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

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

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

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

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

$$F_7 = 0 \ , \quad \text{in domain } \Omega_7$$

where : $F_7 = j - \gamma E$

Besides these equations, the Coulomb's law reads

$$F_8 = 0 \ , \quad \text{in domain } \Omega_8$$

where : $F_8 = f - \dfrac{kq_1q_2}{r^2}$, 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 : $S_1 = k - 9.0\times10^9$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"

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

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.

5.2 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

$$F = -\frac{GMm}{r^2} \quad (6)$$

It can be written as the following form

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

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 [8] we derived the following improved Newton's formula of universal gravitation

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

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

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

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

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

where: w is a constant to be determined.

It can be written as the following form

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

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).

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

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

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

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 [9], 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

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

It can be written as the following form

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

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"

$$\Pi_{\mathrm{G}} = \sum_1^n W_i \int_{\Omega_i} F_i^2 d\Omega_i + \sum_1^m W_j' S_j^2 = \min_0 \qquad (15)$$

where: the subscript G 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 [10], 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

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

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

$$(1 + 5.0381 \times 10^{-8})G \le G' \le (1 + 1.1623 \times 10^{-7})G$$

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

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

The solution procedure can be found in reference [9]. 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 [10], 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).

5.3 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"

$$\Pi_{\text{G.E.S.W}} = \sum_1^n W_i \int_{\Omega_i} F_i^2 d\Omega_i + \sum_1^m W_j' S_j^2 = \min_0 \quad (18)$$

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"

$$\Pi_{\text{NATURE}} = \sum_1^n W_i \int_{\Omega_i} F_i^2 d\Omega_i + \sum_1^m W_j' S_j^2 = \min_0 \quad (19)$$

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 neutrosophic one, namely 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").

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

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 [11], 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.

For this purpose, the neutrosophy will give very important contribution.

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