Proceedings of the First International Conference on

SUPERLUMINAL AND INSTANTANEOUS PHYSICS

as New Fields of Research

Editor: FLORENTIN SMARANDACHE

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Papers of the First International Conference on
Superluminal Physics as New Fields of Research hold at the
University of New Mexico, Gallup Campus, NM 87301, USA, as an
electronic conference on 2-4 July 2012.

Contents

Superluminal Physics & Instantaneous Physics as New Fields of Research

Preface by FLORENTIN SMARANDACHE

In a similar way as passing from Euclidean Geometry to Non-Euclidean Geometry, we can pass from Subluminal Physics to Superluminal Physics, and further to Instantaneous Physics (instantaneous traveling). In the lights of two consecutive successful CERN experiments with superluminal particles in the fall of 2011, we believe these two new fields of research should begin developing.

A physical law has a form in Newtonian physics, another form in the Relativity Theory, and different form at Superluminal theory, or at Instantaneous (infinite) speeds – according to the S-Denying Theory spectrum.

First, we extend physical laws and formulas to super-luminal traveling and to instantaneous traveling. Afterwards, we should extend existing classical physical theories from sub-luminal to superluminal and instantaneous traveling.

And lately we need to find a general theory that unites all theories at law speeds, relativistic speeds, superluminal speeds, and instantaneous speeds, as in the S-Multispace Theory.

The First International Conference on Superluminal Physics as New Fields of Research was hold at the University of New Mexico, Gallup Campus, NM 87301, USA, as an electronic conference on 2-4 July 2012.

Papers of research in the Superluminal Physics and Instantaneous Physics were sent to Prof. Florentin Smarandache, University of New Mexico, Gallup, NM 87301, USA, E-mail: smarand@unm.edu, by July 1st, 2012, to be published in the Proceedings of the First International Conference on Superluminal Physics & Instantaneous Physics as New Fields of Research.

We have selected seven papers from the following authors and co-authors KAIZHE GUO, CHONGWU GUO, CHEN JIANGUO, DONG JINGFENG, MI HAIJIANG, CHANGWEI HU, YANG SHIJIA, GULI, and FU YUHUA.

Below we resume their papers.

The Special Relativity was universally accepted. Nevertheless, the postulate of the constancy of the velocity of light got continuously challenged since its establishment from both theories and experiments, and it is confronted with a series of serious difficulties. "Today, while we affirm and praise the great triumphs achieved by the Relativity Theory, we should work harder to establish a more scientific theory as far as the Relativity Theory is concerned", it is the conclusion of the paper

Review of the Constancy of the Velocity of Light from Innate Character of Lorentz "Local time", by KAIZHE GUO and CHONGWU GUO.

Based on the relativity effect formula presented by Professor Lu Jiahong in 1984, and through the analysis of related experiment and theory, the paper **Principle of Field Potential and FTL Phenomenon** by researchers CHEN JIANGUO and DONG JINGFENG proposes the new conclusion that "the speed of light may be the result of non-linear superimposition". This superimposition rule is based on the "Principle of field potential". The researchers avow, for the reason of nonlinear superimposition of light velocity, that the faster-than-light (FTL) phenomenon is possible.

In another paper, **Superluminal and Instantaneous Phenomenon**, MI HAIJIANG states that the velocity cannot exceed the (maximum) speed of light, and that the speed of light itself is not at fixed speed. "The movement of the light has a period of 'excitement'; in three-dimensional space, it has a 'walking period'. High-frequency photons 'speed' slowly, Neutrinos 'frequency' is relatively small, so it 'speeds' faster", the author utters.

"The invariability of light velocity is a quantitative effect caused by the change of space-time standards", states CHANGWEI HU in the paper **The Superluminal breaks out the Theory of Relativity's Application.** Where the light velocity is slower, a ruler becomes shorter, and a clock runs more slowly. The invariability of light velocity is conditional, and it is established only in the stationary frame of reference. The light is an ether (the physical vacuum) wave; its velocity is different where the ether density is different; the light velocity could be surpassed in the ether, the same way as the super-sound in atmosphere. The delay of radar echo shows that the gravitational field can affect light velocity, and the electric or magnetic field is more likely to affect light velocity, explains the author.

Michelson—Morley's experiment is considered as the decisive experiment according to which to judge whether "ether wind" exists or not. Though the experiment has been done repeatedly for many times, it seems that the calculating method of the experiment has not been studied carefully. In the paper **The original algorithm of Michelson-Morley's Experiment is wrong and the Constancy Principle has always been unfounded**, YANG SHIJIA and GULI show that the algorithm of Michelson—Morley's Experiment is wrong, and that the Michelson's experiment cannot prove the inexistence of "ether wind". The authors' conclusions are that the Constancy Principle has not fundaments, and "Superluminal is a natural phenomenon".

FU YUHUA debates, in the paper **Unified Theory of Natural Science so far and FTL Problems**, about the strict "unified theory". One of the reasons for 1979 Nobel Prize for physics was "the contributions to the theory of the unified weak and electromagnetic interaction between elementary particles". There is a conceptual mistake here: the strict "unified theory" cannot exist, we could only talk about "partial and temporary unified theory so far".

What is the "unified theory"? In 1980, Stephen Hawking claimed that the physicists have seen the outline of "final theory", this theory of everything that could express all laws of nature by a single and beautiful mathematical model, as simple as to be written on a T-shirt. Such a "unified theory" simply cannot exist.

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Review of the Constancy of the Velocity of Light from Innate Character of Lorentz "Local Time"

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Abstract

The classical physics reconsidered the meaning of Lorentz "local time". Set up two inertial reference frames S and S′, the frame S′ is moving at a velocity v relative to frame S in the x direction. When the origin of frame S′ passes the origin of frame S, the clocks at the two frames all read zero. A motionless light source emits light signals in the zero instant in the frame S, one light signal reaches the origin of frame S at time t and another light signal reaches the origin of frame S′ at time t', then t' is Lorentz "local time". The present research indicates that the constant of c derived by using Lorentz "local time", in fact, is the velocity of light in the ether medium, the Lorentz transformation equations cannot be regarded as the mathematical base for the Special Relativity, and it is inevitable that the postulate of the constancy of the velocity of light is challenged by experiments such as results to find super-light velocity.

Keywords

Lorentz "local time", innate character, the velocity of light, ether medium, the Special Relativity, super-light velocity.

Introduction

At the end of 19 century, the hypotheses of Lorentz-Fitzgerald contraction [1] and Larmor-Lorentz time dilation [2] were established for interpretation of Michelson-Morley experiment. H. A. Lorentz had insisted on the ether theory by his life, he raised a concept of "local time" and established Lorentz transformation equations in order to make Maxwell's equations maintain the form invariance under coordinate transformation from one inertial frame to another inertial frame [3], but didn't give the meaning of the "local time". He did not think the "local time" was the clock time, and thought it was merely due to a requirement in mathematics. In 1905, A. Einstein also obtained the Lorentz transformation equations according to the two postulates for the constancy of the velocity of light and the principle of relativity, and defined a new concept of relativistic time there from [4], which changed the space-time concepts formed since Newton's time.

Well, then, what is the meaning of Lorentz "local time"? What is the difference between Lorentz "local time" and the relativistic time? And why was the Special Relativity challenged by a series of results about super-light velocity? Up to the present, these problems are not yet resolved, therefore, Lorentz "local time" is discussed and the constancy of the velocity of light is reviewed in the present research.

1 The Innate Character of Lorentz "Local Time"

Now we explore the innate character of Lorentz "local time" in the classical ether theory. Establish inertial reference frame S and S′. In the two frames, the x-axis and the x'-axis are coincident, the y and y'-axes, the z and z′-axes are parallel respectively. The frame S′ is moving at a velocity v with respect to the frame S along the x-axis towards the x direction. The origins of the two frames pass each other when the clocks in the two frames all read zero. Suppose the space-time coordinates of one event in the frame S relates to the corresponding space-time coordinates in the frame S′ by Galilean transformation.

According to the classical ether theory, the light propagates in the ether medium with the constant velocity of c. Suppose that the frame S is at rest relative to the ether, then the space is isotropic for the propagation of light. In the frame S, we have a motionless light source that is located at point $P(x_0,\ y_0,\ z_0)$. In the frame S′, the light source is moving with the velocity v in the negative x' direction.

At the time $t = t^{'} = 0$, the light source is at point $Q(x_0^{'},\ y_0^{'},\ z_0^{'})$ in the frame S′, and at this instant in time, the light source emits light signals.

At instant $t_1^{'}$, a light signal arrives at the origin O' in the frame S′, and during this time interval $t_1^{'}$, the light source is moving from point Q to point $R(x_1^{'}, y_0^{'}, z_0^{'})$, see figure 1. Obviously, the length of line segment $O'R$ is equal to the distance of the light propagating in the ether medium during the time interval $t_1^{'}$ in the frame S′.

Because the velocity of light is the constant c in the ether medium,

$$O'R^2 = x_1^{'\,2} + y_0^{'\,2} + z_0^{'\,2} = c^2 t_1^{'\,2} \qquad (1)$$

The light source moves with the velocity v relative to the frame S′ towards the left, therefore

$$x_1^{'} = x_0^{'} - v t_1^{'} \qquad (2)$$

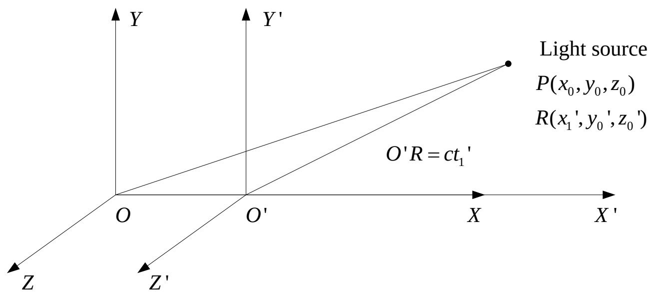

FIGURE 1. *A light signal arrives at the origin O' at instant t_1'*

According to hypothesis of Lorentz (Lorentz-Fitzgerald contraction), we obtain $x_0' = x_0/\gamma$ (3), where:

$$\gamma = 1/\sqrt{1 - v^2/c^2}, x_0'$$

is the value of the x'-coordinate of point Q in the frame S′ and x_0 is the value of the x-coordinate of point P in the frame S.

Put equation (3) into equation (2), we get

$$x_1' = x_0/\gamma - vt_1' \qquad (4)$$

Galilean transformation gives

$$y_0' = y_0 \qquad (5)$$

$$z_0' = z_0 \qquad (6)$$

Putting equations (4), (5), and (6) into equation (1), we obtain

$$\left(x_0/\gamma - vt_1'\right)^2 + y_0^2 + z_0^2 = c^2 t_1'^2 \qquad (7)$$

Solving for equation (7), we get

$$\frac{c^2 t_1'^2}{\gamma^2} + \frac{2vx_0t_1'}{\gamma} + \frac{v^2x_0^2}{c^2} - (x_0^2 + y_0^2 + z_0^2) = 0 \qquad (8)$$

The light source emits light signals at the time $t = 0$ in the frame S. Assume a light signal arrives at the origin O at instant t_2 in the frame S. Since the velocity of light is the constant of c in the frame S,

$$OP^2 = x_0^2 + y_0^2 + z_0^2 = c^2 t_2^2 \qquad (9)$$

where: OP is the distance from point O to point P. Substituting equation (9) into equation (8), we get

$$c^2 {t_1'}^2/\gamma^2 + 2vx_0t_1'/\gamma + v^2x_0^2/c^2 - c^2t_2^2 = 0 \quad (10)$$

Solving for equation (10), we obtain

$$t_1' = \gamma(t_2 - vx_0/c^2) \quad (11)$$

Equation (11) is the same as expression for Lorentz "local time", so we call the time t_1' Lorentz "local time". The t_1' represents the time interval that the light signal takes to travel from the light source to the origin O' in the frame S′, while the t_2 represents the time interval that the light signal takes to travel from the point P to the origin O in the frame S. Therefore, the time t_1' and t_2 are not at the same instant, which is the difference between Lorentz "local time" t_1' and the time t_2.

Substituting equation (11) into equation (4) yields

$$x_1' = \gamma(x_0 - vt_2) \quad (12)$$

Collect equations (5), (6), (11), and (12) together, and strip off the subscripts marking the symbols, we get

$$x' = \gamma(x - vt)$$
$$y' = y$$
$$z' = z$$
$$t' = \gamma(t - vx/c^2)$$

These equations are the same as the equations for Lorentz transformation in the Special Relativity. In these equations, x, y, and z are the space coordinates of the light source at rest in the frame S, and x', y', and z' are the space coordinates of the light source at the instant t' in the frame S′. The preceding arguments have shown, Lorentz "local time" $t' = \gamma(t - vx/c^2)$ is clock time, but the time t' and the time t are not at the same instant in the two reference frames.

2 Discussion on the Constancy of the Velocity of Light

The Special Relativity claimed the Lorentz "local time" was a clock time, and thought t and t' in Lorentz transformation equation of $t' = \gamma(t - vx/c^2)$ were at the same instant. But the present research on Lorentz "local time" shows that the time t and the time t' are not at the same instant. From the preceding statements we know, the Lorentz "local time" is different essentially from the relativistic time in the Special Relativity. In summary, it is inapposite that the Lorentz transformation equations are regarded as the mathematical base for the postulate of the constancy of the velocity of light, and the constant c in the fame S' moving relative to the ether derived by using equation of $t' = \gamma(t - vx/c^2)$ is the velocity with which the light propagates through the ether medium.

3 Experiments that challenge the Special Relativity

In 2000, *Nature* journal declared an experiment result to find super-light velocity by L. J. Wang et al. [5]. Thenceforth, different laboratories in the world have successively obtained a series of parallel test results about super-light velocity. In 2003, R. Y. Wang et al. completed a modified Sagnac experiment, it seems that the result is inconsistent with the constancy of the velocity of light [6]. In 2013, K. Z. Guo et al. pointed out that some electromagnetism laws do not satisfy the principle of relativity whether under Galilean transformation or under Lorentz transformation [7].

These laboratory and thought experiments have powerfully affected the Special Relativity.

4 Concluding Remarks

The Special Relativity has been accepted universally.

Nevertheless, the postulate of the constancy of the velocity of light has been challenged continuously since its establishment from both theories and experiments, and it is confronted with a series of serious difficulties.

Today, while we affirm and praise the great triumphs achieved by the Relativity Theory, we should work harder to establish a more scientific theory as far as the Relativity Theory is concerned.

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Principle of Field Potential and FTL Phenomenon

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Abstract

Based on the relativity effect formula without radical expression presented by Professor Lu Jiahong in 1984, and through the analysis to related experiment and theory, this paper logically proposes the new conclusion that "the speed of light may be the result of a non-linear superimposition". This superimposition rule is taken from the "Principle of field potential". For the reason of nonlinear superimposition of light velocity, the phenomenon of faster-than-light (FTL) is possible.

Keywords

The speed of light superimposed, theory of relativity, principle of field potential, faster-than-light (FTL)

Introduction

The prevalent idea is that the velocity of light cannot be composited. But we can prove that the velocity of light can be superimposed, and the modality of its superposition is nonlinearity. So it is necessary to explain the principle of field potential.

1 Einstein's comprehension on 'light velocity's invariability' is inaccurate

As the measuring result of motion, *velocity* is relative and changeable. *Firstly*, the light velocity can be divided into *phase velocity* and *group velocity*. The phase velocity is often faster than the light speed C, so, the invariable light velocity will only be the group velocity assesable by general method.

Secondly, the most important idea is mean velocity and prompt velocity of light, and the velocity of the invariable light velocity is mean velocity in special relativity. This means:

$$U_{12} = \frac{U_1 + U_2}{1 + U_1 U_2} \qquad (1)$$

Here, 1=C, representing the light speed. This formula was obtained using Lorentz transformation, which presume the light crossing some time and distance. So the velocity should be the mean velocity of light.

Thirdly, any calculation of velocity must have a calculating origin point, and it should be the origin point of the coordinate. The velocity that takes the observer as the calculating origin point is the subjective velocity, and the velocity that takes the motion crossing point as the origin point is the objective velocity. The "invariable light velocity" is the subjective velocity because only the motion relative to observer is taken into consideration in special relativity.

Earlier experiments falsified the "invariable of light velocity". For an example, the delay effect of radar reflected waves proved that light mean speed would be slower if the running distance of light was enough long. The Eq. (1) is effective only in "absolute space" (no mass), but ineffective in any true space.

2 The chance of invariability

The prompt velocity of light is invariable C relative to the vacuum background in which the light passes a point.

According to Huygens principle, every point of light passing through can be considered as a new point of light source. We should consider vacuum as to be not an empty and vast passageway, but the mass absorbing light and radiating light again with speed C. The intrinsic specificity of vacuum mass to absorb and radiate light has no correlation with its integral distribution and the mass that except the light passing point, so light speed is invariable. Because the prompt velocity of light is invariable, the force of light acting in gravitation field could not change light speed, only changes the mass of photon.

According to Newton's second Law:

$$F = \frac{dmv}{dt} = m\frac{dv}{dt} + v\frac{dm}{dt},$$

for the condition that

$$v \equiv c, dv = 0,$$

the gravitation that the photon excepts is F, then

$$v\frac{dm}{dt} = c\frac{dm}{dt},$$

hence

$$\frac{dm}{dt} = \frac{F}{C}.$$

3 Objective invariable light velocity prompts only when light passes a certain point in space, and the point can't have an assignment

Because gravitational field is the mass base of point light source, we obtain the generalized Huygons Principle: Invariable light speed C is only of significance to the gravitation field mass, but it is of none significance to any coordinate of any other points. Because of the relative motion of celestial body (mass center), the position of a point in space relative to the mass centre is variable. Relative to the mass center, the status of motion of any point is uniquely reliable in space. We rule this status to be the "field potential" of the point, and lead to "principle of field potential":

The motion status of a point in space describes the moving or static point related to one celestial body (mass center) "field potential", which is looked as the gravitation, and how that point moves etc. It has no any relation with the absolute universe inertia system.

On a certain point in space, the particle receives the gravitations of celestial bodies from different directions. Suppose there was only one celestial body, the particle-received gravitation was the same as practice. We name this celestial mass centre as "Theoretical mass Centre". The precondition of the supposition is that the algebra sum of the gravitation received by the point is zero when all the gravitations is offset, and we say its gravitation is equal to zero. Let the mass of a particle is m_0, the distance from gravitation mass centre to it is *r*, and the velocity that the particle motion develops relatively to the centre is *v*. According to the reference [1], the gravitation that the particle follows is:

$$F_G = F_N - \frac{v^2}{c^2}F_N = F_N\left(1 - \frac{v^2}{c^2}\right),\ F_N = -\frac{GM_0m_0e^{\frac{\alpha}{r}}}{r^3}r,\ \alpha = \frac{GM_0}{c^2},$$

where: M_0 is the mass of gravitation source, G is the gravitation constant, e is the natural logarithm root (see reference [2]). Then, the variable of gravitation due to particle's motion is: $\Delta F = -F_N\left(\frac{v^2}{c^2}\right)$ (2).

4 The nonlinear composition of light velocity

The objective prompt light velocity through a point in space is invariable. But the particles' "field potential" could shift relatively to a special mass centre. Hence, let some celestial mass centre be the origin point of the coordinate. To calculate the velocity of light from that point far away, it is compulsory to add the velocity of the field potential. Because of the nonlinear motion of field potential, this super-imposition of light velocity is called the nonlinear super-imposition of light velocity. The visualized add method can be discussed as follows:

(1) When there is only one gravitation source or other sources of gravitation are far-off the field potential and have no effect to the field potential, then

$$F_G = F_{N};\quad \triangle F = 0$$

In this case, the field potential around the gravitational mass is not moving; the gravitations that any particle received are all standard. The subjective velocity and the objective velocity are the same (C). It is the case on the earth surface and its vicinity.

(2) When there are other mass centers near one mass center, the case will be intricate. Let two mass centers be relatively static, and be the same case as one mass centre. That is to say, the vicinal field potential is not moving:

$$F_G = F_{N};\quad \triangle F = 0\ .$$

(3) When two masses centers are relatively in motion, every point's field potentials are in motion.

5 AB line connecting two mass centers

Let us set the AB line connecting two mass centers in relatively motion A and B as a limit to discuss the problem. Let D represents one point in AB line. Because of the equilibrium of the gravitations from two celestial bodies A and B on point D, the field potential of that point is static.

According to reference [1], we have the formula:

$$\frac{BD}{AD} = \sqrt{\frac{M_A}{M_B}} \qquad (3)$$

where: AD and BD represent the distances of D from A, B. M_A and M_B represent the masses of A, B. The point D is called the "Fixed point of field potential" among A, B.

Let E represents the free point in AB line. Let $v = v_A$ represents the velocity of the relatively motion at A and B. Let v_E represents the velocity of field potential motion in E, and set A as the grid origin to observe the motion of E. According to reference [1], we have the formula:

$$\frac{v_E}{v_A - v_E} = \sqrt{\frac{M_B}{M_A}} \cdot \frac{AE}{BE} \qquad (4)$$

This formula can be used to calculate the velocity of field potential motion in any point on AB line. When A and B are separated, v_E is positive. When A and B are closed, v_E is negative. Let A as the grid origin to calculate the velocity of light in E, need plus or subtract v_E. To assume that the celestial object A (the Earth) and the celestial object B (the sun) is at the speed of 100 km per second to get away from each other. Then on the Earth point to the sun at high altitude 3629 km, only produces 3.7 km/s of the incremental speed of light; this cannot be founded at the case of the general measurement. It shows that the variation of the velocity of light may be difficult to found at present.

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Superluminal and Instantaneous Phenomenon

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Abstract

The 'objects' move in three-dimensional space by a single granule "on" and "off" effect. Velocity cannot exceed the (maximum) speed of light. The speed of light itself is not a restricted speed. The movement of the light has a period of 'excited'; in three-dimensional space has a 'walking period'. High-frequency photons 'speed' slowly, but Neutrinos 'frequency' is relatively small, so it 'speeds' faster. That happens because at the same objective quality of a momentum, a heavier object speed might be slower. In the interval of the zero space, there is not time, nor speed; therefore, the information in the zero space or space itself is instantaneous.

Keywords

'Frequency single-particle', the four physical mechanism, excitation type, zero space， three-dimensional space.

In this paper, we try to explain the nature of super-luminal and instantaneous phenomenon, and the nature of four physical mechanisms produced by 'light'. The four physical mechanisms determine the essence of the speed.

1 The particularity of light

(1) No initial velocity and acceleration; (2) an electromagnetic wave can enter in the cabin of the aircraft, the light cannot; (3) electromagnetic wave with the positive electrode and the negative electrode “light” waves without; (4) light is displayed on the screen, the cycle is one white and one black, white is the 'energy', black is not energy (should be negative energy); (5) the energy equation of macroscopic wave and electromagnetic wave, there are amplitude factor, and the ‘light’ energy $E = \gamma h$ formula (energy is equal to the frequency by Planck constant) description, no amplitude in wave energy formula.

All 'Frequency single-particle' are equal, so the 'volume and weight' are equal.

‘Light’ acts similarly to a 'mutton string'; the ‘light’ has no wavelength, only 'Frequency single-particle' distance between.

The ‘light’ is not a wave. It is a type of excitation. The ‘light’ is traveling in a straight line, as the advertisement on the edge of a small bulb.

One leaves a "bright", then triggers a second small bulbs also 'bright'; the first small lamp automatically turns off; then the third lamp starts light-emitting, automatically turning off the second small bulbs; then fourth bulbs is excited towards luminescence, and the third small bulbs off; so on. One can see the ‘light’ at a certain speed, moving from left to right.

‘Light’ like 'mutton string': if the rod strings 'Frequency single-particle' are not connected with each other, one observes the composition of light wave from the infrared to the most low-frequency X-ray; if the ‘Frequency single-particle' rod strings are connected to each other, even the overlap will become light particles (X light to the r particles);

if 'mutton string' strings 'Frequency single-particle' little, even only one. That is the neutrino or Frequency single-particle.

Single particle composition space, under certain conditions, high frequency light into particles or substances.

2 About this model

A. In the zero space built three-dimensional space. The characteristics of three-dimensional space are having a magnetic, dielectric constant and the three-dimensional space.

The three-dimensional space has a minimum temperature. In the laboratory, when the temperature drops to near 0 degrees, a partial region of the anti-magnetic, superconducting, and loss of three-dimensional. Three-dimensional loss. The 'particles' lose shape and unable to locate, overlap together, people mistakenly called condensed.

B. Null space: in the sky, Newtonian mechanics failure area, looking up at the sky, is the dark area or high temperature area. Space in the high temperature zone is cooled to 10 degrees. The liquid temperature high surrounded by nuclear skin, into the nucleus.

3 Nuclear quantum mechanics describes the nature of the zero space

The quantum mechanics formula exists in the space (x, y, z) and time (t), this is because Scientists to understand the microscopic world from the point of view of the macroscopic world, Time and space on this math, not real time and space, is a mathematical 'operator'.

C. About Time. Light in space 'movement': Step by step 'walk' on the frequency of single particle'. It is calculated, per meter of space arranged 2.22*10 'frequency single-particle'， light After the accomplishment of these time just one second.

The 'light' from each of the 'frequency single particle' excitation, whether this 'frequency single-particle' with energy or without energy, are issued two amplitude information: One positive information switch in the 'on' door ('1'), and the other negative information in the' off 'door ('0').

'Frequency single-particle' in the 'ON' state when the supply space to the energy, the energy of motion in the universe, and shows the 'time'; 'Frequency single-particle' in the 'off' state, cut off the energy of the space, sports interrupt, but the state is saved to the next 'open'。'Open' doors and start the energy to continue the movement and time; Negative energy fracture, does not affect the continuous movement and time. This time series relationship is very similar to modern computer technology.

4 Determine the superluminal and instantaneous phenomenon

Four physical machines: Zero space quantum mechanisms; Newton mechanisms in three-dimensional space; Electromagnetic mechanism of space itself; The shuttle photo-thermal mechanism between the zero space and space and three-dimensional space.

A. The 'objects' movement in three-dimensional space, by a single granule "on" and "off" effect. Velocity cannot exceed the (maximum) speed of light.

B. The speed of light itself is not a fixed speed.

The movement of the light has a period of 'excited'; in three-dimensional space has a 'walking period'. High-frequency photons 'speed' slowly, Neutrinos 'frequency' is relatively small, so it 'speeds' faster. This is because the same object quality of momentum, a heavier object speed is slow.

C. In the interval of the zero space, not time, no speed, but the existence of information, therefore, the information in the zero space or space itself is instantaneous.

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The Superluminal breaks out the Theory of Relativity's Application

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Abstract

The superluminal exists, but it breaks out the theory of relativity's application. The invariability of light velocity of relativity is a quantitative effect caused by the change of space-time standards; or, where the light velocity is slower, a ruler becomes shorter, and a clock runs slower. The invariability of light velocity is conditional; one can establish it only in the stationary frame of reference. The light is an ether (the physical vacuum) wave, and its velocity is different where the ether density is different. The light velocity is surpassed in the ether the same way as the existence of the super-sound in atmosphere. The delay of radar echo shows that the gravitational field can affect light velocity, then the electric or magnetic field is more likely to affect light velocity; thus, a experiment is conceived.

Keywords

The superluminal, theory of relativity, Space-time theory, Quantitative effect, Physical vacuum (Ether).

Introduction

Before 17th century, the people believed that the light velocity was infinite. Galileo doubted that the first. Later astronomers verified that the light velocity was finite through the phenomena of Jupiter satellite eclipse in 18th century. Einstein, in the beginning of 20th century, regards the light velocity invariability as a basic principle, which progressively gained widely recognition in physics circles.

But the invariability of light velocity means that the superluminal does not exist? No, it does not. The invariability of light velocity, whose establishment has certain conditions and range, is relative.

A light velocity is a ratio of the distance to the time the light travels, so that it is related to space-time theories. It is generally considered that the absolute space-time theory was negated by relativistic space-time theory, but they are, in fact, two different space-time theories in nature, their relations are not one negating another, and yet there are complementary between them. A light velocity is variable in absolute theory. The light velocity is invariable only in relativistic space-time theory, and even there, the establishment of invariability of light velocity needs certain conditions yet. Moreover, describing light velocity, one has to take into account the light's nature. We will point out that the physical vacuum (ether) is a medium transmitting light.

There are many results relative to superluminal theories, observations and experiment. For example, the superluminal expansion of the quasars, the superluminal phenomena in the quantum tunnel effects and so on[1-3]. Actually, one may include superluminal phenomena in cosmic inflation and quantum teleportation etc..

1 The invariability of light velocity is a quantitative effect

The mathematical expression of absolute space-time theory is the Galileo transformation:

$$\begin{cases} x_2 = x_1 - vt_1 \\ y_2 = y_1 \\ z_2 = z_1 \end{cases} \quad \begin{cases} x_1 = x_2 + vt_2 \\ y_1 = y_2 \\ z_1 = z_2 \end{cases} \quad t_2 = t_1 \qquad (1)$$

The mathematical expression of relativistic space-time theory is the Lorentz transformation:

$$\begin{cases} x_2 = \beta(x_1 - vt_1) \\ t_2 = \beta(t_1 - vx_1 / c^2) \\ y_2 = y_1 \\ z_2 = z_1 \end{cases} \quad \left(\beta = 1/\sqrt{1 - v^2/c^2}\right) \qquad (2)$$

If $v << c$, (2) $\rightarrow$ (1), so that the absolute space-time theory can be considered that is an approximation of relativistic space-time theory when $v << c$. Are there other relations between them besides this relation? Yes, they are.

There is a transformation of the fluid from a compressible to an incompressible state in fluid mechanics:

$$\begin{cases} x' = \beta x \\ y' = y \\ z' = z \end{cases} \qquad (3)$$

that is to say, substituting (3) into a compressible fluid equation (of linearization) $f(x, y, z) = 0$, can obtain an incompressible fluid equation $f'(x', y', z') = 0$.

Substituting (3) into (1) (besides $t_2 \neq t_1$) can derive the Lorentz transformation easily[4], which shows that absolute and relativistic space-time theories are two kinds of space-time theories in nature, they are not that one negated other, and yet have intrinsic relationship. Conveniently, the description based on absolute space-time theory is called absolute description; the description based on experimental data is called quantitative description. The theory of relativity is a quantitative description.

The absolute space-time theory has tree characteristics:

first, space and time have nothing to do with the matter; second, time and space are independent separately; third, the standards of time and space are invariable, which can be proved by the Galileo transformation. Moreover, many people, including Newton, thought that the absolute space-time theory meant there was an absolute stationary space, which is a misunderstanding and is an error because there is not existent room of a absolute stationary space in Galileo transformation. Space and time are used to express the motion of matter, so that the space and time are without movement themselves. However, the statement, "a substance moves in space and time", always gives person a feeling that space is relatively stationary. The movement of the matter is relative to the reference frame, and then the stationary space can be understood as that there is a relative stationary absolute space in any inertial reference frame, and they are equivalent in Newtonian physics. The so-called static space-time, in fact, is a space-time reference system that makes physical description; it can be arbitrarily defined because absolute standard of space-time has nothing to do with the material environment. We can determine a rigid coordinate system in any inertial reference frame to make space-time description of things. This relative coordinate system rest to the reference frame is an abstract mathematical expression of an absolute space.

The absolute space-time theory, which is a scientific abstraction, describes the world with an invariable space-time standard. But the physics is an experimental science, whose theory should be identical with actual measuring data, so that physical space-time is a measurable relative space-time, which is not necessarily to be a real space-time because the tools of measure space-time such as ruler, clock and particular light can vary with environment more or less. Therefore, there are always certain differences between the actual quantitative relation and the absolute description. The effects caused by the differences, or the variability of actual space-time standards, are called quantitative effects.

Now the most accurate standards of length and time are defined by light and the invariable velocity of light., for example, a meter is the distance traveled by light in a vacuum in 1/299,792,458 of a second[7], where the distance traveled by light in a vacuum in a second is always 299792458 meters whether it is fast or slow, the light speed become an invariable defined speed, which is just a premise of relativity, so that we can regard the relativity as a quantitative descriptive theory with light as the measure of space-time, it takes the change of space-time standards as the change of space-time itself. Thus, the invariability of light velocity is a quantitative effect, that is to say, the light velocity is variable in absolute space-time theory; but where the light velocity is slower, the relativistic length standard becomes shorter, and time standard runs more slowly, so that the light velocity is invariable in quantitative description.

The theory of relativity does not negate the absolute space-time theory. Moreover, the theory of relativity does not depart from the absolute space-time theory yet because it explains how the space-time standard changes with the help of the relative invariable quantities, which are the quantities of the absolute description, that is to say, the proper quantities in relativity, in fact, are just the quantities of absolute description. Therefore, we can regard the relations (4) of length contraction and time dilation in the special theory of relativity as the relations between unit time dt , unit length dr of quantitative description and unit time dt_0, unit length dr_0 of absolute description.

$$dt = \frac{dt_0}{\sqrt{1-v^2/c^2}} \qquad dr = \sqrt{1-v^2/c^2}\, dr_0 \qquad (4)$$

And thus, Eq. (4) can be called quantitative effect equations in the special theory of relativity.

Similarly, there are the equations (5) in the general theory of relativity.

$$dt = \frac{dt_0}{\sqrt{1+2\varphi/c^2}} \qquad dr = \sqrt{1+2\varphi/c^2}\, dr_0 \qquad (5)$$

where: φ is the gravitational potential. Eq. (5) can be called quantitative effect equations in the general theory of relativity.

Citing an example, the delay of radar echo [5,6] shows that a light velocity goes slower in gravitational field, which can be solved simply by Eq. (5) that the relation between unit velocity dr/dt of quantitative description and dr_0/dt_0 of absolute description is

$$dr/dt = \frac{\sqrt{1+2\varphi/c^2}\, dr_0}{dt_0 \sqrt{1+2\varphi/c^2}} = (1+2\varphi/c^2)\, dr_0/dt_0 \text{。} \qquad (6)$$

Let the light velocity is c when it is without gravitational field, then the light velocity of absolute description, namely the velocity with unit dr_0/dt_0 in a gravitational field is

$$c_0 = (1+2\varphi/c^2)c = \left(1-\frac{2GM}{c^2 r}\right) \text{ Unit } dr_0/dt_0 \qquad (7)$$

which is identical completely with the result of the general theory of relativity.

Obviously, the conclusion that the velocity of light becomes slower in a gravitational field is an absolute description, which is the result of measuring the velocity of light over the whole solar gravitational field with an invariable space-time standard. Quantitatively, the principle of the invariability of the velocity of light is still established because the standards of space-time in a gravitational field can vary with gravitational potential. Using the quantitative space-time standard of one point to measure the velocity of light of this point, according to Eq. (6), if the quantitative unit dr/dt is substituted for the absolute unit dr_0/dt_0 in Eq. (7), then the velocity of light is always equal to the constant c:

$$c_0 = (1+2\varphi/c^2)\ c/(1+2\varphi/c^2) = c \text{ Unit } dr/dt \qquad (8).$$

2 The invariability of light velocity is conditional

As indicated above, the invariability of light velocity is a quantitative effect; it is not absolute, but conditional. In the original paper of relativity "On The Electrodynamics of Moving Bodies", the principle of the invariability of light velocity was defined by Einstein: "Any ray of light moves in the 'stationary' system of co-ordinates with the determined velocity c, whether the ray be emitted by a stationary or by a moving body", where Einstein indicated clearly that the invariability of light velocity was established only in the "stationary" system of co-ordinates.

He imagines further that a rod, whose two ends are the A and B and its axis lying along the axis X, moves with uniform velocity v in the positive direction of X, let a ray of light depart from A at the time t_A, let it be reflected at B at the time t_B, and reach A again at the time t'_A, here the time t_A, t_B, t'_A and the length of moving rod r_{AB} all were measured in the stationary system. Then he said: "taking into consideration the principle of the constancy of the velocity of light we find that $t_B - t_A = \frac{r_{AB}}{c - v} and t_A^{'} - t_B = \frac{r_{AB}}{c + v}$."[7]

Let two frames of reference A and B move relatively with velocity v. Both of two observer on the A and B separately consider that the velocity of a light relative to him is c, whose causes are that their space-time standards are different. Then how is the observer on the A considers that the light velocity relative to B? It should be calculated with the Galileo transformation, or the light velocity is $c - v$ when direction c is identical with v, and that is $c + v$ when the direction of c and v are opposite because there is only one observer and one space-time standard here, in which the superluminal occur ($c + v$). Einstein is just to use this point of view to derive the Lorentz transformation, which was thought by someone that deriving the Lorentz transformation is based on the absolute space-time theory, so that it is error and is a contradictory. Such an opinion is incorrect, it can only use method of absolute space-time theory if measuring things only in one frame of reference, where the space-time standard is invariable; while the relativity is that measuring things with the space-time standards in different frame of references, where the space-time standards are variable.

A French scientist Georges Sagnac made a experiment in 1913 and discovered a physical effect, which is called the Sagnac effect, [8] which shows that two counter-propagating light beams take different time interval a closed path on a rotating disk, while the light source and detector are rotating with the disk. When the disk rotates clockwise, the beam propagating clockwise takes a longer time interval than the beam propagating counter-clockwise, while both beams travel the same light path in opposite direction.

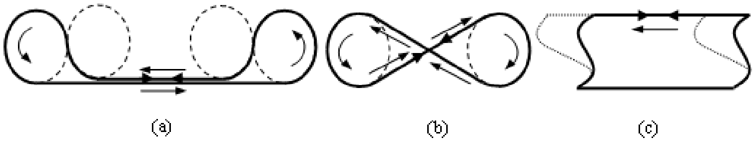

FIGURE 1. *The generalized Sagnac Effect experiment.*

Few years ago, American scientists prof. Ruyong Wang and others substitute a fiber optic conveyor (FOC) for the rotating disk showed as figure 1, and thus, the medium of light not only can make uniform circular motion but also can make uniform straight motion as (a), (b); moreover they yet made the experiment of cut parallelogram as c shows that the above is moving and the following no motion etc. They found that any segment of the loop contributes to the total phase difference between two counter-propagating light beams in the loop. The contribution is proportional to a product of the moving velocity vector V and the length vector L of segment:

$$t = (2/c^2)V \cdot L \qquad (9)$$

where the motion is straight or circular, and the travel-time difference does not relate to a refractive index of light medium.

This conclusion includes the Sagnac effect for rotation as a special case, so that it is called the generalized Sagnac effect[9,10], whose nature is not rotation and loop area, and yet it is velocity and length of the segment.

In the generalized Sagnac effect, let a segment Δl of optic fiber moves with uniform velocity v, and it is measured with the standards of length and time in the stationary system, by

Einstein's viewpoint, the light velocity is c - v that its direction is identical with v; and it is $c+v$ that its direction is opposite with v, then the phase difference that two counter-propagating light beams travel through the segment of optic fiber is $\Delta t = \frac{\Delta l}{c-v} - \frac{\Delta l}{c+v} = \frac{2v\Delta l}{c^2-v^2}$, where $c^2 - v^2 \approx c^2$ because the v is far little to the c, and thus $\Delta t \approx \frac{2v}{c^2}\Delta l$, which is identical with Eq.(9). Therefore the generalized Sagnac effect supports the formulation of Einstein for the principle of invariance of light velocity.

The theory of relativity shows that actual space-time standards vary with environment. The space-time standards are invariable and the Galilean law of composition of velocity is established in one inertia frame of reference, while relativistic law of composition of velocity, in fact, is a velocity transformation between two different inertia frames of reference. In above instance, a light beam sends from A to B, then the observer on the A can calculate with the Galilean law of composition of velocity: the velocity of the light beam is c relative to A and is c-v relative to B; if want to ask that the velocity of this light beam relative to an observer on the B, which is that the observer is transferred from A to B, and thus, should use relativistic law of composition of velocity, whose calculated result is c.

To sum up, in absolute space-time theory, the velocity of light is variable, relativistic invariability of light velocity is a quantitative effect caused by the actual change of space-time standards. Owing to light velocity is a invariable definitional velocity, so that where the light velocity is slower in absolute description, the actual most accurate rule is contracted and the actual most accurate clock goes slower, therefore the light velocity of immediate measure is always the invariable, in which the immediate measure refer to the measure that measuring meter, site and man are all on the same place. If it is not the immediate measure, then a light velocity is variable. In the generalized Sagnac effect, the space-time measure tools in stationary system are used to measure the light velocity in moved system, hence the light velocity is variable. Therefore, there exist the superluminal motion in nature, which cannot be measured directly, but can be discovered indirectly with comparative method. For example, the light velocity become slower in gravitational field, which is a indirect measured result; there existing the superluminal motion in the quasar and tunnel effect are yet the results of indirect conjecture.

3 The superluminal, similar to the supersonic

As indicated above, the Lorentz transformation could be derived by the means of fluid mechanics, where there is a special fluid, whose distribution is infinite in space where the speed of sound is the speed of light in vacuum, cannot be a conventional fluid. It is, in fact, the physical vacuum, called ether and only the ether as a super-fluid can satisfy the fluid mechanics equation of linearization.

As all know, a vacuum is not void, and the ether is a matter without mass. The theory of quantum fields assumes that a physical vacuum is the basic state of the quantum field, which is a microscopic description. The image of matter can lead to a significant difference between the microscopic and the macroscopic descriptions. For instance, microscopically, water is composed of molecules, which move at random, and it is difficult to be found its most fundamental characteristic as a fluid of continuity. Otherwise, in microscopic system, the ether not only is related to gravitational field but also yet suffers strong involvement of electromagnetic field and color field, so that the image of ether become quite complex. Above derivation shows clearly that macroscopic ether is a compressible fluid, which opened up a new field of vision. Moreover, the ether mainly relates to gravitational field in macroscopic system, where ether can even show its truth.

The light is a sound in the ether, and thus, we can make a comparison between the superluminal and supersonic. The superluminal derived by the Galilean law of composition of velocity is only a presentation and is not necessarily a real superluminal, while the supersonic in the ether is just the real superluminal. As anyone knows, an objects moving in the air can compress the air and cause the resistance. When the speed of the object is close to the speed of sound, the density and pressure of the air in its front would be rise greatly, and thus, a sound barrier formed. Similarly, when an object is moving in the vacuum, its mass and energy, or the density and pressure of its own ether wave-packet, can increase along with the velocity. When the speed of the object is approaching the light velocity, the density and pressure of the ether would be rise greatly, and thus, a light barrier formed.

The theory of relativity is a quantitative descriptive theory with light as the measure of space-time. If a light beam travels along with an object in same direction, this light beam would be compressed into a point when the velocity of this object attain or surpass the light velocity. Therefore, the theory of relativity does not describe the movement of an object with velocity light velocity or superluminal.

In order to describe superluminal phenomenon, the theory of relativity must be amended.

Yang Xintie and others indicated [11] that an approximate

Small disturbance method of conservative equation of fluid mechanics can be written in the form of extensional invariability, and the metric invariant of extensional relativity in Compressible fluid mechanics could also be writing. To be mindful, the magnitude of error is not great than the error of accuracy of experiment of verification of relativity effect. This answers the question: How an aerodynamic method can be used to develop the theory of relativity, make it again back to Galileo space, and only with very small modification. The result can be used to make the experiment of super light.

4 Probably the light velocity is affected by electric or magnetic fields

As indicated above, the invariability of light velocity is a quantitative effect. The light velocities measured directly in different places in vacuum are all the c, but it is probable that they are different actually in absolute space-time theory.

Radar echo delay shows that gravitational field can affect the light velocity. Light is electromagnetic wave, so that the electric or magnetic field should even be able to affect the light velocity. There is probable that if make direct measurement at any point in the vacuum within the electric or magnetic fields, the light velocity is a constant value, that is to say, electric or magnetic potential would affect the light velocity.

We all know that the light velocity in the physical media is less than in vacuum. This is generally attributed to the interaction between light and real particles. The interior of the atomic constituting an object is, in fact, empty. For example, the hydrogen atom, its radius is at least 0.53×10^{-10}m, and the radius of its nuclei (proton) is less than 1×10^{-15}m. The proportion of the volume of the nucleus in an atom is much smaller than the proportion of the volume of the sun in the solar system. An electron is considered a point particle. Then it is almost all the vacuum within an atom, but it is full of the electromagnetic fields. Therefore, the interaction between the light and object is mainly the interaction between the light and electric or magnetic field. This indicates that the light velocity decreasing in the medium is related to the electric or magnetic interaction.

Of course, whether the electric and magnetic field affect the light velocity should be answered by the experiment which is conceived below.

4.1 Experimental principle

Using the principle of the Michelson interferometer: adding a strong magnetic or electric field in the optical path of the Michelson interferometer to observe whether it causes the change of the interference fringes when changing the magnetic or electric field, hence to distinguish whether the magnetic or electric fields affect the light velocity.

4.2 Experimental device

The impact of the gravitational field is very weak to the light velocity, so that people detect the light velocity slowed down with the earth, sun and a planet as experimental platform. The impact of electric or magnetic field to the light velocity should be much stronger than the gravitational field. But to discover this effect in the laboratory, we have to enlarge the experiment; one can start from the two aspects, lengthening the optical path in the magnetic or electric field and enhancing the intensity of the magnetic or electric field. The optical path of ready-made Michelson interferometer is generally too short, and it should be lengthened to at least tens or hundreds meters in this experiment. It can also use the fiber optic cable to replace the optical path of Michelson interferometer. The type of the fiber optic cable in Michelson interferometer is showed as the Figure 2. The longer the fiber optic cable in L is, the better it will be under the premise that does not leak light. As for the magnetic or electric field in L, its intensity and direction can be adjusted better, so that it is convenient to quantitative analysis. Of course, it can be made step by step; for instance, it is made gradually with different intensity and direction of the magnetic or electric field, such as making their direction vertical or parallel to the light, and so on.

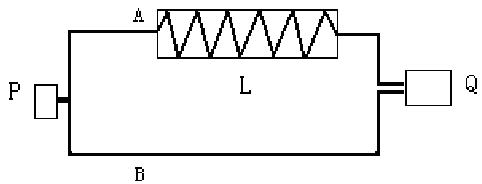

FIGURE 2. *The fiber optic cable type Michelson interferometer: P is light source; Q is interference screen; A and B is fiber optic cable; L is magnetic or electric field generator.*

4.3 Experimental procedures

For the fiber optic cable type Michelson interferometer, at first, without opening L, let a laser beam send into the two fiber optic cable A and B at the same time, and adjust the interference screen to obtain the clear interference image. Then, opening L, if there is a change of interference fringes, to observe and analyze the relationship between the interference fringes and the intensity or direction of the magnetic or electric field. In addition, it can also test about the relationship between the interference fringes and the intensity or frequency of alternating electromagnetic field. For the interior of fiber optic cable is not vacuum, it is required to test repeatedly with different refractive index of the fiber optic cable to prove that the change of the interference fringes has nothing to do with the refractive index of the light conduction medium.

The type of fiber optic cable in Michelson interferometer exists in the magneto-optical effect including Faraday effect, magnetic birefringence effect, and photoelectric phenomena and so on, which have a certain impact on the interference fringes and makes the experimental analysis complicated. In this regard, one can make the length of two optic cables A, B the same, and make the form of placing the same.

Of course, one had better increase the optical path in the magnetic or electric field rather than using the fiber optic cable.

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The original algorithm of Michelson-Morley's Experiment is wrong and the Constancy Principle has always been unfounded

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Abstract

Michelson's experiment can't be calculated by the formula $\Delta m=\frac{c\Delta t-c\Delta t'}{\lambda}$, but $\Delta m=\frac{|c\Delta t|-|c\Delta t'|}{\lambda}$ should be used. In Michelson's experiment, even if "ether wind" does exist, it does with the correct algorithm, $\Delta m=\frac{|c\Delta t|-|c\Delta t'|}{\lambda}=0$.
The interference stripe does not move, and of course, one cannot observe the movement of the interference stripe in the experiment. Therefore, we conclude: The original algorithm of Michelson—Morley's Experiment is wrong, Michelson's experiment cannot prove the inexistence of "ether wind", so the Constancy Principle has always been unfounded. Which is also to say that the Superluminal is a natural phenomenon.

Keywords Michelson's experiment, calculating, mistake.

Introduction

Michelson—Morley's experiment is considered as a decisive experiment, according to which to judge whether "ether wind" exists or not. Though the experiment has been done repeatedly for many times, it seems that the calculating method of the experiment has not been studied carefully. I am interested in the method of the calculation and have been studied it for a long time then I found that the original algorithm of the experiment is wrong [7].

1 Sufficient and Necessary Condition of the establishment of Formula $\Delta m = \frac{(r_2 - r_1) - (r_2' - r_1')}{\lambda}$

Shown in figure one[2],[4],[6]: we can suppose that $r_2' = r_1$, $r_1' = r_2$, two points S_1, S_2 send out the light ray, which spread to space, $(r_2 - r_1)$ corresponds to point P, the $(r_2' - r_1') = -(r_2 - r_1)$ correspond to point P'; $(r_2 - r_1)$ and $-(r_2 - r_1)$ correspond to different set of points. The numeric values of $(r_2 - r_1)$ moves along with interference stripe; oppositely,

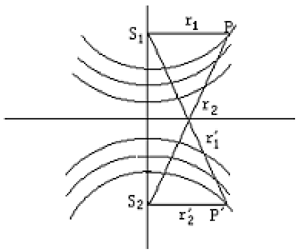

Figure one

interference stripe varies along with the numeric values of $(r_2 - r_1)$, Just as Young's experiment. Only in this case, the formula $\Delta m = \frac{(r_2 - r_1) - (r_2' - r_1')}{\lambda}$ is tenable, we get:

Conclusion one: The number that interference stripe moves along with the change of the optical path length difference is equals to the variable quantity of optical path length difference divided by the wavelength $\left(\Delta m = \frac{(r_2 - r_1) - (r_2' - r_1')}{\lambda}\right)$ only when the relationship between interference stripe and optical path difference $(r_2 - r_1)$ is in one–one correspondence.

2 The Light Route of Michelson's Experiment is closed

Michelson's experiment is different from Young's experiment, the light route of Michelson's experiment is closed. we may suppose that $l_1 = l_2 = l$ in Michelson's experiment[1],[3][5].

Fig two shows: $\Delta t = \frac{2l}{c\sqrt{1 - v^2/c^2}} - \frac{2l}{c(1 - v^2/c^2)}$ corresponds to point A[5],

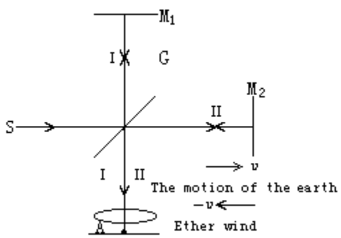

Figure two

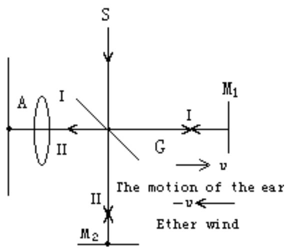

Figure three (The whole interferometer is turned by 90°)

Fig three: $\Delta t' = \frac{2l}{c(1 - v^2/c^2)} - \frac{2l}{c\sqrt{1 - v^2/c^2}}$ corresponds to point A also.

Obviously, before and after the whole interferometer is turned by 90° in the experiment, Δt and $\Delta t' = -\Delta t$ correspond to the same set of point, and according to the formula

$$\bar{I} = A_1^{\ 2} + A_2^{\ 2} + 2A_1A_2\cos\left[\frac{2\pi}{\lambda}(r_2 - r_1)\right]$$

We know that the average light intensity of the interference stripe corresponding to Δt and $-\Delta t$ is the same, which means that the brightness of the Interference Stripe is the same. Therefore, we get:

Conclusion two: In Michelson's experiment Δt and $-\Delta t$ corresponds to the same observational interference stripe.

3 The Difference between Michelson's Experiment and Young's Experiment

Based on the foregoing, in Young 's experiment, the interference stripe and the difference $(r_2 - r_1)$ is in one–one correspondence; but in Michelson's experiment, before and after the whole instrument is turned by 90°, optical path difference $c\,\Delta t$ and $-c\,\Delta t$, which is opposite number of each other, correspond to the same observational interference stripe. Therefore, the relationship between the interference stripe and the difference $(r_2 - r_1)$ is not in one–one correspondence. So we get:

Conclusion three: Michelson's experiment doesn't have the necessary condition for the formula $\Delta m = \frac{(r_2 - r_1) - (r_2' - r_1')}{\lambda}$ is tenable.

4 The Formula $\Delta m=\frac{(r_2-r_1)-(r_2'-r_1')}{\lambda}$ can't be used in Michelson's Experiment

According to the conclusion three, Michelson's experiment doesn't have the necessary condition for the formula $\Delta m=\frac{(r_2-r_1)-(r_2'-r_1')}{\lambda}$ is tenable, therefore, in a other word, the formula $\Delta m=\frac{c\Delta t-c\Delta t'}{\lambda}$ is untenable in Michelson's experiment. So we get:

Conclusion four: The formula $\Delta m=\frac{c\Delta t-c\Delta t'}{\lambda}$ is untenable to Michelson's experiment.

5 The Correct Algorithm for Michelson's Experiment

Based on the foregoing, in Michelson's experiment, the relationship between the interference stripe and the difference (r_2-r_1) is not one–one correspondence, but the interference stripe and the absolute value of the difference $|r_2-r_1|$ is in one–one correspondence, if and only if the $|r_2-r_1|$ changes, the interference stripe moves. So we get:

Conclusion five: The formula $\Delta m=\frac{|c\Delta t|-|c\Delta t'|}{\lambda}$ is tenable in Michelson's Experiment.

6 Inexistence of the "Ether Wind" can't be proved by Michelson's Experiment.

In Michelson's experiment, $l_1=l_2=l=11$ meter [1],[3],[5],

$$\because \quad \Delta t = \frac{2l}{c\sqrt{1-v^2/c^2}} - \frac{2l}{c(1-v^2/c^2)}$$

$$\Delta t' = \frac{2l}{c(1-v^2/c^2)} - \frac{2l}{c\sqrt{1-v^2/c^2}}$$

$\therefore \Delta t = -\Delta t'$, substitute it into the formula $\Delta m = \frac{|c\Delta t| - |c\Delta t'|}{\lambda}$, we get:

$$\Delta m = \frac{|c\Delta t| - |-c\Delta t|}{\lambda} = 0$$ [7].

Therefore, in Michelson's experiment, even if "ether wind" does exists, with correct calculation, $\Delta m = \frac{|c\Delta t| - |c\Delta t'|}{\lambda} = 0$.

The interference stripe does not move, so that the movement of interference stripe can't be observed in the experiment. So we get:

Conclusion six: Inexistence of the "ether wind" cannot be testified by Michelson's experiment.

7 The Discussion of $l_1 \neq l_2$

Shown in diagram two, we can suppose that the distance from the mirror G to the mirror M_1 is l_1, and the distance from the mirror G to the mirror M_2 is l_2, then

$$\Delta t = \frac{2l_1}{c\sqrt{1-v^2/c^2}} - \frac{2l_2}{c(1-v^2/c^2)}$$

$$\Delta t' = \frac{2l_1}{c(1-v^2/c^2)} - \frac{2l_2}{c\sqrt{1-v^2/c^2}}$$

(1) If $l_2 < \sqrt{1-v^2/c^2}\, l_1$, $\frac{l_1}{\sqrt{1-v^2/c^2}} > \frac{l_2}{1-v^2/c^2}, \frac{l_1}{1-v^2/c^2} > \frac{l_2}{\sqrt{1-v^2/c^2}}$ then

$\Delta t > 0, \Delta t' > 0$, according to the formula $\Delta m = \frac{|c\Delta t| - |c\Delta t'|}{\lambda}$ we get:

$$\Delta m = \frac{|c\Delta t| - |c\Delta t'|}{\lambda} = \frac{c\Delta t - c\Delta t'}{\lambda} = \frac{2(l_1 + l_2)}{\lambda}\left(\frac{1}{\sqrt{1 - v^2/c^2}} - \frac{1}{1 - v^2/c^2}\right)$$

(2) If $l_2 > \frac{l_1}{\sqrt{1 - v^2/c^2}}$, $\frac{l_1}{\sqrt{1 - v^2/c^2}} < \frac{l_2}{1 - v^2/c^2}, \frac{l_1}{1 - v^2/c^2} < \frac{l_2}{\sqrt{1 - v^2/c^2}}$ then $\Delta t < 0, \Delta t' < 0$, according to the formula $\Delta m = \frac{|c\Delta t| - |c\Delta t'|}{\lambda}$, we get:

$$\Delta m = \frac{|c\Delta t| - |c\Delta t'|}{\lambda} = \frac{-c\Delta t - (-c\Delta t')}{\lambda} = \frac{c\Delta t' - c\Delta t}{\lambda} = \frac{2(l_1 + l_2)}{\lambda}\left(\frac{1}{1 - v^2/c^2} - \frac{1}{\sqrt{1 - v^2/c^2}}\right)$$

(3) If $\sqrt{1 - v^2/c^2}\, l_1 < l_2 < \frac{1}{\sqrt{1 - v^2/c^2}} l_1$, $\frac{l_2}{1 - v^2/c^2} > \frac{l_1}{\sqrt{1 - v^2/c^2}}, \frac{l_2}{\sqrt{1 - v^2/c^2}} < \frac{l_1}{1 - v^2/c^2}$ then $\Delta t < 0, \Delta t' > 0$, according to the formula $\Delta m = \frac{|c\Delta t| - |c\Delta t'|}{\lambda}$, we get:

$$\Delta m = \frac{|c\Delta t| - |c\Delta t'|}{\lambda} = \frac{-c\Delta t - c\Delta t'}{\lambda} = \frac{2(l_2 - l_1)}{\lambda}\left(\frac{1}{1 - v^2/c^2} + \frac{1}{\sqrt{1 - v^2/c^2}}\right)$$

In Michelson's experiment, if $l_1 \neq l_2$, but come close sufficiently, if $\sqrt{1 - v^2/c^2}\, l_1 < l_2 < \frac{1}{\sqrt{1 - v^2/c^2}} l_1$, to calculate according to the formula

$$\Delta m = \frac{|c\Delta t| - |c\Delta t'|}{\lambda} = \frac{-c\Delta t - c\Delta t'}{\lambda} = \frac{2(l_2 - l_1)}{\lambda}\left(\frac{1}{1 - v^2/c^2} + \frac{1}{\sqrt{1 - v^2/c^2}}\right), \Delta m \approx 0,$$

therefore, the interference stripe don't move basically, so that the obvious movement of the interference stripe can't be observed in the experiment.

Conclusions

Therefore, we conclude: The original algorithm of Michelson—Morley's Experiment is wrong, Michelson's experiment cannot prove the inexistence of "ether wind", and so the Constancy Principle has always been unfounded. The Superluminal is a natural phenomenon.

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Unified Theory of Natural Science so far and FTL Problems

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Abstract

The strict "unified theory" cannot exist. The "partial and temporary unified theory of natural science so far" can be established by applying least square method, and including all the equations of natural science so far. In this way, the theory of everything described by Hawking to express all of natural laws, that a single equation could be written on a T-shirt, is partially and temporarily realized in the form of "partial and temporary unified variation principle of natural science so far". With the help of "partial and temporary unified theory of natural science so far", this paper successfully deals with some faster-than-light (FTL) problems. From a ray of light to observe another ray of light, the variation range of the speed of another light equals 0 to 2c (c=300,000 km/s). 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. According to Hubble's law, the value of far away speed of a galaxy is the exponential function of time, and therefore it can be faster-than-light.

Keywords Unified theory, partial and temporary unified theory of natural science so far, partial and temporary unified variation principle of natural science so far, Hawking, T-shirt, Hubble's law, faster-than-light.

Introduction

One of the reasons for 1979 Nobel Prize for physics was "the contributions to the theory of the unified weak and electromagnetic interaction between elementary particles". There is a conceptual mistake: the strict "unified theory" cannot exist; there can only be a "partial and temporary unified theory so far" (it may be simplified as "unified theory 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, if the "unified electromagnetic theory" cannot exist, nor does the "unified gravitational theory", the "unified strong interaction theory", or the "unified weak interaction theory". Moreover, we have to change the "unified theory" into "partial and temporary unified theory so far".

What is the "unified theory"? In 1980, Stephen Hawking claimed that physicists have seen the outline of the "final theory": a theory of everything that can express all laws of nature with a single and beautiful mathematical model, perhaps as simple as to be written on a T-shirt.

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

If following this concept to understand the strict "unified theory", such a "unified theory" 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; 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? Thirdly, whether or not the faster-than-light (FTL) problems can be solved by Maxwell's equations? If negative answers are 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 we establish the "partial and temporary unified electromagnetic theory so far". First, for any field, the least square method applies in order to to establish the field’s "partial and temporary unified theory so far" (the corresponding expression is "partial and temporary unified variation principle so far").

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

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

The boundary conditions are as follows:

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

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 variation principle so far"

$$\Pi = \sum_1^n W_i \int_\Omega F_i^2 d\Omega + \sum_1^m W_j ' \int_V B_j^2 dV = \min{}_0 \qquad (3)$$

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 variation 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 variation 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.

We note 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 variation principle", "unified theory of fluid mechanics" and "unified variation principle of fluid mechanics" were appeared. In this paper, we correct these mistakes.

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

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. We discuss all of them 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 variation principle so far"

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

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.

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

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

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 [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 exist.

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

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

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).

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

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, 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.

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

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"

$$\Pi_{\text{GRAVITY}} = \sum_1^n W_i \int_{\Omega_i} F_i^2 d\Omega_i + \sum_1^m W_j ' S_j^2 = \min{}_0 \qquad (15)$$

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 variation 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 variation principle).

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

Example 1. Setting $W_2 = 1$ and $W_1' = 1$ in variation 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 variation 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), variation 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 variation 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 variation 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 variation 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 variation 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 variation 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 variation principle of natural science so far".

As already noted, for "partial and temporary unified theory so far" and the corresponding "partial and temporary unified variation 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 variation principle for partial and temporary unified theory of natural science so far" (it is shorted as "variation 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 "variation 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 variation principles) and their combinations. These will make "partial and temporary unified theory of natural science so far" simpler, clearer, more accurate, and more practical.

4 Applying "partial and temporary unified theory of natural science so far" to deal with a number of FTL problems

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 in reference [8] that there is not the upper limit of speed in the universe. The hypothesis that there is the upper limit of speed contradicts 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 that 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.

In reference [9], 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.

A question that Einstein might not have considered is: will light be bending only in gravitational field?

The answer is negative. 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 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 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.

In reference [9], Einstein firstly noticed the exterior contradiction between the law of light propagation and the principle of relativity. The main content is as follows.

Again, we choose roadbed as the reference system. If a light is projected along with the roadbed, the front end of this light will be spread relative to the roadbed with the speed of light c. Now we assume that our railway carriage is still traveling at speed v on the railway rail, its direction is the same as the direction of the light. We study the propagation speed of this light relative to the railway carriage. Setting W is the speed of light relative to the carriage, we have W=c-v.

Therefore, the speed of light relative to the carriage is less than the value of c. But this result is incompatible with the principle of relativity. According to the principle of relativity, the law of propagation of light in vacuum, just like all of other universal laws of nature, whether taking carriage as reference object, or taking railway rail as reference object, the results must be the same.

For this type of contradiction, Einstein put forward two options: (1) Give up the principle of relativity, or give up the law of propagation of light in vacuum. (2) Systematically follow-up these two laws, and get a logically rigorous theory.

According to the second option, Einstein established the special theory of relativity.

Einstein's meaning is that, in this case, the value of the speed of light is unchanged. Our problem is that, in other cases, whether or not the value of the speed of light is still unchanged.

The answer is also negative. 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 equals 0 to 2c.

In this case, choosing the law of composition of velocities from "partial and temporary unified variation principle of natural science so far" (Eq.(19)), 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:

$$V_{Photon} = 2c\sin(\theta/2) \qquad 0 \le \theta \le \pi \qquad (21)$$

In other cases, whether or not the value of the light speed 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. In addition, the special theory of relativity and the principle of constant speed of light can also cause other errors. Now we discuss the phenomenon of “clocks look slower", and the wrong result caused by this phenomenon.

As well-known, the phenomenon of "clocks look slower" causes the twin paradox: according to theory of relativity, supposing 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 will. The twin paradox means: Because the movement is relative, 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 should. Such two conclusions are mutually conflicted.

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 quite long period they begin to decelerate simultaneously until static state, then they turn around to navigate again along the same straight line with the manner of front end to front end, 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 the same?

It should be noted that, for the problems associated with energy and speed, if considering the principle of conservation of energy as the only truth, in that way the other so-called "principle", "law", "hypothesis", and so on, are all no longer the truth, therefore the hypothesis that there is the speed limit is not the truth, and it would be a mistake in some cases.

Now we discuss that, 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.

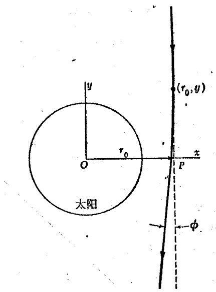

FIGURE 1. *An object passes through the Sun's gravitational field at the speed of light.*

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.

Choosing the principle of conservation of energy and the improved gravitational formula Eq.(7) from "partial and temporary unified variation principle of natural science so far" (Eq.(19)).

Substituting the half normal chord p given by general relativity or improved gravitational formula into Eq.(7), it gives

$$F=-\frac{GMm}{r^2}-\frac{1.5GMmr_0^2}{r^4} \qquad (22)$$

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

$$v_{\max}=\sqrt{c^2+3GM/r_0} \qquad (23)$$

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

$$v_{\max}=(1+3.18\times10^{-6})c \qquad (24)$$

Now we discuss the phenomenon caused by Hubble's law.

Choosing the Hubble's law from "partial and temporary unified variation principle of natural science so far" (Eq.(19)).

Hubble's law reads

$$V=H_0\times D \qquad (25)$$

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

$$V = \frac{dD(t)}{dt} = H_0 \times D(t) \quad (26)$$

From this differential equation, it gives

$$D = ke^{H_0 t} = k\exp(H_0 t) \quad (27)$$

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

$$V = kH_0 \exp(H_0 t) \quad (28)$$

The far away acceleration is as follows

$$a = dV/dt = kH_0^2 \exp(H_0 t) \quad (29)$$

According to Newton's second law, the force acted on this galaxy is as follows

$$F = ma = mkH_0^2 \exp(H_0 t) \quad (30)$$

Based on Eq.(28), apparently we can reach the result that because the value of far away speed of a galaxy is the exponential function of time, therefore it can be faster-than-light.

For more detail about this question, we will discuss it in another paper.

Conclusion

Not only that the "Partial and temporary unified variation principle of natural science so far" can be printed on a T-shirt, but it also can be used to deal with FTL problems.

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Keywords

calculating
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Physical vacuum
principle of field potential
Quantitative effect
Space-time theory
super-light velocity
the four physical mechanism
the Special Relativity
The speed of light superimposed
The superluminal
the velocity of light
theory of relativity
three-dimensional space
T-shirt
Unified theory
zero space

In a similar way as passing from Euclidean Geometry to Non-Euclidean Geometry, we can pass from Subluminal Physics to Superluminal Physics, and further to Instantaneous Physics (instantaneous traveling). In the lights of two consecutive successful CERN experiments with superluminal particles in the Fall of 2011, we believe these two new fields of research should begin developing.

A physical law has a form in Newtonian physics, another form in the Relativity Theory, and different form at Superluminal theory, or at Instantaneous (infinite) speeds – according to the S-Denying Theory spectrum.

First, we extend physical laws and formulas to superluminal traveling and to instantaneous traveling. Afterwards, we should extend existing classical physical theories from subluminal to superluminal and instantaneous traveling.

And lately we need to find a general theory that unites all theories at: law speeds, relativistic speeds, superluminal speeds, and instantaneous speeds – as in the S-Multispace Theory.

The First International Conference on Superluminal Physics as New Fields of Research was hold at the University of New Mexico, Gallup Campus, NM 87301, USA, as an electronic conference on 2-4 July 2012.

There were seven papers selected for this volume by the following authors and coauthors: KAIZHE GUO, CHONGWU GUO, CHEN JIANGUO, DONG JINGFENG, MI HAIJIANG, CHANGWEI HU, YANG SHIJIA, GULI, and FU YUHUA.

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