Article

The Interrelation among Theory of Relativity, Vacuum & Absolute Space-Time Theory

Changwei Hu*

Abstract

In fluid mechanics, there exists a transformation from a compressible fluid to an incompressible one. Applying this transformation to the Galilean transformation, one can derive the Lorentz transformation. In so doing, these transformations demonstrate the links among the vacuum, absolute space-time theory and relativity. It turns out that the vacuum (ether) when treated as a compressible superfluid can serve as the basis of relativity. The theory of relativity makes up the shortcoming of absolute space-time theory in quantity, while the basis and limitations of relativity can be shown from absolute space-time theory. Relativistic and absolute space-time theories are two different space-time theories but there are certain relationships and complementarities between them.

Key Words: theory of relativity, vacuum, ether, absolute space-time theory, quantitative effect.

1. Introduction

The vacuum is not a void as shown by the Casimir effect [see, e.g., 1, 2]. Is there any connection between the vacuum and relativity? This question does not seem to be researched. As for the absolute space-time theory, it is considered generally that it was already to be negated by relativity, and it is only an approximation of relativity under some conditions. Nevertheless, it is not sure so.

The Lorentz transformation is the nucleus of relativity. For the first time in history, FitzGerald proposed that ether, a continuous medium in vacuum state, had the ability to contract the dimensions of any object: contraction occurring in the direction of motion and in proportion to the speed through the ether [3]. On the basis of this assumption, the Lorentz transformation was completed progressively by Larmor (1897, 1900) [4] and Lorentz (1899, 1904) [5, 6] and was brought its modern form by Poincare (1905) [7, 8] who give this transformation the name of Lorentz. Their viewpoint was established on the basis of absolute space-time theory, and it is short of rationality because the motion is relative and the velocity relative to the ether is difficult of determination. Afterwards, Einstein (1905) showed in course of his development of special relativity, that this transformation concerns the nature of space and time [9], that is to say, the space of a moved body is contracted and its time is inflated. Nevertheless, it is like an axiomatic system that derived a series of quantitative relations from several principles but the mechanism

* Correspondence: Changwei Hu, Beijing Relativity Theory Research Federation, Beijing, China.
E-Mail: huchangwei@sina.cn

why this quantitative relations can be established does not be explained. Therefore what it describes is only some appearance.

There are, in fact, some intrinsic relations between the theory of relativity and fluid mechanics. In the 80's of the 20th century, I was already to point out that the Lorentz transformation can be derived by means of fluid mechanics [10]. Contemporaneously, Liao Mingsheng discovered that the equations with form of relativistic formula can be obtained through taking Lorentz covariance to the fundamental equations of fluid mechanics [11, 12]. Later, Yang Xintie and others considered that relativistic effects are similar to compressible effects of fluid [13,14]. These can provide leads for researches in physical basis and limitation of relativity.

2. The derivation of the Lorentz transformation by means of fluid mechanics

In fluid mechanics, the velocity potential ϕ of an incompressible fluid satisfies the following equation:

$$\Delta\phi(x.y.z) = 0 \qquad (1)$$

Let a body move with velocity v in an infinite compressible fluid, which causes disturbances in the velocity, density and pressure. If the disturbances are assumed to be infinitesimal quantities of the first order, the equation of linearization can be obtained[15]:

$$\left(1-\frac{v^2}{c^2}\right)\frac{\partial^2\phi}{\partial x^2}+\frac{\partial^2\phi}{\partial y^2}+\frac{\partial^2\phi}{\partial z^2}=0 \quad \left(\frac{v}{c}<1\right) \qquad (2)$$

Where c is the speed of sound in the fluid.
The following transformation (3) can be used:

$$\begin{cases} x' = \beta x \\ y' = y \\ z' = z \end{cases} \left(\beta = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}\right) \qquad (3)$$

Substituting (3) into (2), the resulting equation is identified with (1):
$\Delta\phi(x'.y'.z') = 0$.

Therefore, (3) is the transformation of the fluid from a compressible to an incompressible state.

If two parallel right-angled coordinate systems $O_1(x_1, y_1, z_1)$, $O_2(x_2, y_2, z_2)$ are constructed on two special fluids that satisfy equation (2), if their x-axes are superposed, and if O_2 with speed v

moves in the positive x-direction, a Galilean transformation can be performed between them, as in Eqs. (4) and (5):

$$\begin{cases} x_2 = x_1 - vt_1 \\ y_2 = y_1 \\ z_2 = z_1 \end{cases} \tag{4}$$

$$\begin{cases} x_1 = x_2 + vt_2 \\ y_1 = y_2 \\ z_1 = z_2 \end{cases} \tag{5}$$

(Note: here, the time t is written as t_1 and t_2 separately.)

Substituting（3）into（4）and（5）, where x_1 in （4）and x_2 in（5）do not change because they are of the proper length, gives Eqs. (6) and (7):

$$\begin{cases} x_2' = \beta\left(x_1' - vt_1\right) \\ y_2' = y_1' \\ z_2' = z_1' \end{cases} \tag{6}$$

$$\begin{cases} x_1' = \beta(x_2' + vt_2) \\ y_1' = y_2' \\ z_1' = z_2' \end{cases} \tag{7}$$

Substituting the first equation in（6）into（7） leads to

$$t_2 = \frac{1}{v\beta}\left(x_1' - \beta^2 x_1' + \beta^2 vt_1\right) = \beta\left(t_1 - \frac{x_1'\left(\beta^2 - 1\right)}{v\beta^2}\right),$$

$$\beta^2 = \frac{c^2}{c^2 - v^2},$$

$$t_2 = \beta\left(t_1 - \frac{vx_1'}{c^2}\right) \tag{8}$$

If the speed of sound c in the special fluid is the speed of light in a vacuum, then the combination of（6）and（8）is the Lorentz transformation.

Above 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 macroscopic physical vacuum. Moreover the Galilean transformation expresses the absolute space-time theory, and the Lorentz transformation expresses the relativistic space-time theory, therefore the vacuum, absolute and relativistic space-time theories are linked together by above derived course.

3. The macroscopic physical vacuum is a compressible superfluid

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 find its most fundamental characteristic as a fluid of continuity. Above derived course shows that the macroscopic physical vacuum is a continuous fluid, which is called “ether”.

Moreover any body can move without resistance in the ether, whether it is smooth, rough or full of cracks. Therefore, the ether is a superfluid, and only a superfluid can satisfy the established condition of equation (2) completely. There are two different sounds in a general super-fluid: the first sound of density wave, which is the conventional sound; and the second sound of temperature wave [16], which propagates with heat. In the vacuum, the thermal propagation is carried out through thermal radiation, namely, similar to the electromagnetic wave, therefore the electromagnetic wave, including the light, is the second sound in ether.

Somebody can say that the ether theory in the 19th century was already to be negated by the Michelson-Morley experiment, how is the explanation of compressibility ether theory? This question, in fact, was already to have a definite answer. In compressible fluid, there exists the phenomenon where the stripe of loop sound interference is invariant to the speed of wind, which was verified by Liu Weiping , Su Benqing , Xi Deke and Yang Xintie with numerical simulation and sound interference experiment. Norbert Feist, a Germanic engineer, made a experiment of Galilean velocity meter in high-velocity car, and the stripe of loop sound interference is also invariant [17]. These facts show that the moved effect of fluid is offset by compressible effect of fluid, or the relativistic effect is equivalent to compressible effect of ether.

The derivation of the Lorentz transformation by means of fluid mechanics shows that the ether is the compressible in absolute space-time theory, and it become the incompressible, namely the four dimensional space-time continuum, in the relativistic space-time theory.

4. Description of formulas of relativistic form from the formulas of fluid mechanics

The ether is an incompressible superfluid in the relativity, where we can regard ether as an ideal fluid, in which having a disturbances of sound, its equation of state is

$$dP = c^2 d\rho \qquad (9)$$

Where the P is the pressure, c is velocity of sound, ρ is the density, the dP and $d\rho$ are the tiny increment of the pressure and density separately.

The Eq.(9) is identical with the mass-energy relation of relativity formally, which seems to mean that the relativistic energy is corresponds to the tiny increment of ether pressure and the relativistic mass is corresponds to the tiny increment of ether density. Has whether such a corresponding relation universality? Let us make some analyses further.

The ether should satisfy the equation of continuity: $\frac{\partial\rho}{\partial t} + div\rho\vec{u} = 0$. Using the Lorentz covariance, it can be shown that

$$\begin{cases} \rho' = \beta\rho\left(1 - \frac{vu_x}{c^2}\right) \\ \rho' u_x' = \beta\left(\rho u_x - v\rho\right) \\ \rho' u_y' = \rho u_y \\ \rho' u_z' = \rho u_z \end{cases} \qquad (10)$$

Where the u is the velocity of moved body; the v is the velocity that a frame of reference $O'(x', y', z')$ relative to $O(x, y, z)$ and its direction is parallel to the x-axis.

Substituting the first equation into the second, third and fourth equations in Eq. (10), gives Eq. (11):

$$\begin{cases} u_x' = \frac{u_x - v}{1 - vu_x / c^2} \\ u_y' = \frac{u_y}{\beta\left(1 - vu_x / c^2\right)} \\ u_z' = \frac{u_z}{\beta\left(1 - vu_x / c^2\right)} \end{cases} \qquad (11)$$

$$\vec{u}^2 = u_x^2 + u_y^2 + u_z^2 ;\ \vec{u'}^2 = u_x'^2 + u_y'^2 + u_z'^2 \tag{12}$$

According the Eqs.(11) and (12), the Eq.(13) can be proved[12]

$$\sqrt{1-u'^2/c^2} = \frac{\sqrt{1-u^2/c^2}}{\beta\left(1-u_x v/c^2\right)} \tag{13}$$

By the first equation of (10) and (13), it can be obtained

$$\frac{\rho'}{\rho} = \beta\left(1-u_x v/c^2\right) = \frac{\sqrt{1-u^2/c^2}}{\sqrt{1-u'^2/c^2}},\ \text{then } \rho'\sqrt{1-u'^2/c^2} = \rho\sqrt{1-u^2/c^2} = \rho_0\ \text{(a constant), or}$$

$$\rho = \frac{\rho_0}{\sqrt{1-u^2/c^2}} \tag{14}$$

Taking differentiation of density in the two sides of Eqs. (10) and (14), gives Eqs. (15) and (16):

$$\begin{cases} d\rho' = \beta d\rho\left(1-\dfrac{vu_x}{c^2}\right) \\ u_x' d\rho' = \beta\left(u_x d\rho - v d\rho\right) \\ u_y' d\rho' = u_y d\rho \\ u_z' d\rho' = u_z d\rho \end{cases} \tag{15}$$

$$d\rho = \frac{d\rho_0}{\sqrt{1-u^2/c^2}} \tag{16}$$

Obviously, the Eq. (11) is the formulae of velocity transformation in the relativity; while the density ρ can be replaced by mass m in (15) and (16), which are separately the transformation of mass and momentum, and the mass-velocity formula, in the relativity. Therefore there is universality that the relativistic mass is corresponds to the tiny increment of ether density. Why is it so? This question concerns the space-time theories.

5. The relations between two space-time theories: The quantitative effects

The derivation of the Lorentz transformation by means of fluid mechanics shows that the absolute and relativistic space-time theories are two different space-time theories in nature. Newton said that the space and time can be divided into the absolute and the relative [18]. The absolute space and time are not related to matter, and they are difficult to be measured because the measure is a course interacted or interlinked between a measuring tool and a measured body. The relative space and time are related to matter and can be measured. People know the absolute space-time through the relative space-time. The physics is a experimental science, whose space-time are all the measurable relative space-time. What the classical physics researches are the physical phenomena in low velocity or weak gravitational field, where the differences are very small and may be omitted between relative and absolute space-time, so that the space-time of the classical physics was considered to be the absolute space-time. the differences are obvious between these two space-time in high velocity or strong gravitational field, and thus, the relativistic phenomena occur.

A few people or groups' intuitions are not reliable, but the intuitions of entire mankind are the real generally. The absolute space-time, which describes the world with an invariable space-time standard, considers that the space is flat three dimensions and the time is homogeneous one dimension, which is a reflection of human intuitions. However, the actual standard tools of length and time, such as rulers, clocks and light, can vary with the environment due to temperature, velocity and gravitational potential. Thus, there are always certain differences between the actual quantitative relation and the absolute space-time theory. Ordinary rulers and clocks can vary with temperature, which can't be considered that space-time is changing because it can be proved that these changes are only the changes of rulers and clocks themselves by more accurate way of measuring space-time. But scientist can regard a change of space-time standard as a change of space-time itself if the most accurate measuring tools can change, and the relativistic space-time theory is just such a physical space-time theory, which is considered that is a practicable mathematical model by the absolute space-time theory.

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, 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 definitional speed, which is just a premise of relativity, so that we can regard the relativity as a quantitative theory with light as the measure of space-time. The description on the basis of absolute space-time theory is called the absolute description, which describes the world with an invariable space-time standard. The description on the basis of relativistic space-time theory is called the quantitative description, which describes the world with a variable space-time standard. There are always certain differences between the quantitative and absolute descriptions. The effects caused by this differences or the variability of space-time standards are called quantitative effects. The theory of relativity is a theory of quantitative description, and the relativistic effects are the quantitative effects.

There can be different representations one thing in different space-time theory, or there are certain discrepancies between two different space-time theories, that is to say, there seems that any quantitative theory may be twisted more or less by a quantitative effect.

6. The corresponding relationships between two descriptions

There are some discrepancy, and certain corresponding relationships as well, between absolute and quantitative descriptions. Above equations of fluid mechanics are established on the basis of the absolute space-time theory. Using the Lorentz covariance, these equations would are transformed into relativistic space-time theory, and thus, the meaning of related physical quantities will change, so that there are some corresponding relationships between transformation before and after, which is just the meaning of above "the relativistic mass is corresponds to the tiny increment of ether density." Because mass is a characteristic of an object (the matter with mass) and does not have spatial extension, and in view of the relationships between mass and a gravitational field, the intrinsic relationship among the ether, gravitational field and objects can be found. The distribution of the ether density is closely related to the objects in the unified ether ocean of the cosmos. The object is the core of the ether density wave-packet, and its mass center is the point of maximal value of the ether density. Here, the corresponding relationships between the quantitative and absolute descriptions are as follows: the absolute value of the gravitational potential corresponds to the ether density, the intensity of the gravitational field corresponds to the gradient of the ether density, and the mass corresponds to the increment of the ether density (relative to the average density of the ether). The energy corresponds to the increment of the ether pressure (relative to the average pressure of the ether).

For one physical phenomenon, we can make an absolute description and a quantitative description as well. For example, the deflection of light in gravitational field, absolutely it is that a light beam bends to where the ether density is higher because the distribution of ether is not uniform in a gravitational field, which is just as the sound bends to where the atmosphere density is higher; while quantitatively the light is described as moves along a geodesic line in a bent space of the gravitational field.

An object with mass m, the relation between its gravitational potential ϕ and the distance r away from it is $\phi \propto m / r$ 。It can be known with simple calculation that the ϕ of the earth < ϕ of the sun < ϕ of the galaxy and so on. Therefore Prof. Tsao Chang said: "The ether background field seems a very deep sea, and the change of ether density nearby a object is only small wave on a surface of this sea." [19] Then it is practicable that the mass of an object is regarded as the tiny increment of density in ideal ether fluid.

7. The quantitative effects equations of relativity and its application

The theory of relativity made up the shortcoming of absolute space-time theory in quantity, but it does not depart from the absolute space-time theory because it explains how the space-time standard changes with the help of the quantity of the absolute description. The proper quantities in relativity are the quantities of absolute description, and thus, there are certain complementarities between the quantitative and absolute descriptions.

The special theory of relativity shows that the relation between unit length dr or unit time dt and velocity v are

$$dt = \frac{dt_0}{\sqrt{1 - v^2 / c^2}} \tag{17}$$

$$dr = \sqrt{1 - v^2 / c^2}\, dr_0 \tag{18}$$

Where dr_0 and dt_0 are the proper unit length and time, respectively. They do not vary with velocity and are used to measure the change of space-time standards on objects in relative motion with any velocity. Thus, they are the unit length and time in the absolute description on this inertia frame of reference, and Eqs. (17) and (18) are the equations of quantitative effects in the special theory of relativity.

Similarly, it is can be proved there are Eqs. (19) and (20)[20]

$$dt = \frac{dt_0}{\sqrt{1 + 2\varphi / c^2}} = \frac{dt_0}{\sqrt{1 - 2GM / c^2 r}} \tag{19}$$

$$dr = \sqrt{1 + 2\varphi / c^2}\, dr_0 = \sqrt{1 - 2GM / c^2 r}\, dr_0 \tag{20}$$

Where the dt_0 and dr_0 are the proper unit length and unit time on the reference frame that is far away from the gravitational field, the φ is the gravitational potential of a heavenly body, the M is the mass of this heavenly body. The dt_0 and dr_0 do not vary with the gravitational potential; that is, they are the quantity in the absolute description. Eqs. (19) and (20) are the equations of quantitative effects in the general theory of relativity.

The equations of quantitative effects can be used to explain relativistic phenomena simply. Two examples are given below.

The experiment on the delay of radar echo[21.22] showed that the velocity of light becomes slower in a gravitational field, which can be solved simply using (19) and (20): the relation between the velocities of the quantitative description (dr / dt) and the absolute description （dr_0 / dt_0） is

$$dr / dt = \frac{\sqrt{1 + 2\varphi / c^2}\, dr_0}{dt_0 / \sqrt{1 + 2\varphi / c^2}} = (1 + 2\varphi / c^2) dr_0 / dt_0 \tag{21}$$

Let the velocity of light without the gravitational field is c. Then, the velocity of light with units of dr_0 / dt_0 in the gravitational field is

$$c_0 = (1 + 2\varphi / c^2)c = (1 - \frac{2GM}{c^2 r})c \quad \left(dr_0 / dt_0\right) \qquad (22)$$

Eq. (22) is identical to the calculated result of the general theory of relativity with complex way.

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 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 (21), if the quantitative unit dr / dt is substituted for the absolute unit dr_0 / dt_0 in (22), then the velocity of light is always constant c, which shows the complementarity between these two descriptions.

The frequency of light in vacuum should be invariable in the absolute description, but it should be variable in the quantitative description because its space-time standards vary with gravitational potential. Thus, using two clocks of different standards measure one beam of light, a gravitational red shift occurs.

The frequency of light is proportional to the time interval of unit time, quantitatively, according to (19), it is

$$v = \frac{kv_0}{\sqrt{1 - 2GM / c^2 r}} \qquad (23)$$

Where the k is a proportional constant.

Equation (23) shows that the frequency of light can vary with the gravitational potential. If one light beam lies to the radial positions r_1 and r_2 successively in a gravitational field, then obtain

$$\frac{v_1}{v_2} = \frac{\sqrt{1 - 2GM / c^2 r_2}}{\sqrt{1 - 2GM / c^2 r_1}} \qquad (24)$$

Equation (24) is the formula of the gravitational red shift of a spectral line in the Schwarzschild geometry.

8. The mechanism responsible of relativistic effects

The mechanism responsible of relativistic effects was described in certain degree by above ideas of vacuum and quantitative effects. The relativistic effects include kinematical effects of the special theory of relativity and the gravitational effects of the general theory of relativity. Both of them can be seen as the effects of density change in the ether. A change in the ether density causes a change in the actual space-time standard, or where the density of the ether is greater, rulers become shorter, and clocks run more slowly. The kinematical effects are due to the compressibility of the ether: if an object moves in a compressible ether, its own density is increased such that a ruler becomes shorter, and a clock runs more slowly. The gravitational effect is due to the ether density, which corresponds to the gravitational potential. Where the absolute value of the gravitational potential is greater, a ruler becomes shorter, and a clock runs more slowly.

According to the method of fluid mechanics, the ether can be described as being composed of countless ether particles. Then, the unit length is proportional to an interval between two adjacent ether particles, and the unit time is proportional to the time interval that the light travels through an interval of ether particles. Using such standards to measure the ether, it becomes homogeneous and isotropic, and the light velocity is invariable. In addition, both of the standards of length and time have a relationship with the interval of the ether particles. Thus, the space and time are entangled, and are turned into the four dimensional space-time continuum. Therefore we can say that the ether is the material basis of the relativity.

The general theory of relativity considers that the four dimensional space-time continuum is homogeneous and isotropic but it is bent, where it regards the change rate of standards of space-time as the curvature of time-space. As the absolute space-time theory see it is only a mathematical model describing the distribution of ether is not homogeneous.

9. The limitation of relativity

The special theory of relativity considers that any relative motion can cause relativistic effects, which is not necessarily so actually. For example, the stars move around the earth due to the rotation of the earth, which does not cause relativistic effects, otherwise the velocity of the stars will be much greater than the light speed when the stars are more than one light-year far away from the earth.

The relativistic phenomenon is caused by the changes of the ether density. Then, relative motion can be divided into formal motion and substantial motion, the formal motion is that the ether density himself of the moving objects does not change, it would only produce the observed effect and the formulas of relativity are ineffective. The substantial motion is that the ether density himself of the moving objects can change, it would produce real effects, and the formulas of relativity are effective. The phenomenon of the stars moving around the earth is caused by the earth's rotation, which is only the formal motion because they do not affect each other between the ether wave-packets of the earth and stars. Of course, the pure formal motion or pure substantial motion does not exist. It is probable that both of relative motion, one is the substantial motion and the other is formal motion mainly. For example, the movement of a particle in the earth ether field is a substantive motion, while the earth moves relative to this particle is the formal motion because earth ether wave packet does not be affected by the particle overall. The relative motions between the sun and earth, comparatively speaking, the movement of the earth around the sun is a substantive motion, and the movement of the sun around the earth is a formal motion. Therefore the heliocentric theory is greater than the geocentric theory, and the relativity of the movement is always set up in the form, but both of relative motions are not necessarily equalization essentially.

When a body moves, the ether's distribution around it would change, so that the ether is not an absolute frame of reference. Because the kinematical effects are due to the compressibility of the ether, the ether where an object is located must be used as the reference frame. When studying the movement of a body in the galaxy, the sum of the ether wave-packet without the galaxy could be regarded as a homogeneous background field, and thus, the galactic ether wave-packet should be used as the reference frame. When studying the movement of a planet in the solar system, the galactic ether wave-packet becomes part of the background field because the distance is nearly the same between each planet and the galactic center. Thus, the solar ether wave-packet should be used as the reference frame. However, the solar ether wave-packet also becomes part of the background field on the surface of the earth, and thus, the ether wave-packet of the earth should be used as the reference frame when studying phenomena on the earth. The experiment of atomic clocks flying around the earth conducted by Hafele and Keating in 1971[23.24] proved this point. The experiment showed that, on average, a flying clock is slower by 59×10^{-9} seconds than a clock on the ground after flying towards the east, and the flying clock is faster by 273×10^{-9} seconds than the clock on the ground after flying towards the west, which demonstrates that "a moving clock is always slower" is not necessarily true. Here, the center of mass of the earth must be taken as the origin of the coordinates system. Only in this way can the calculations with the formulae of the special theory of relativity lead to results that are roughly in agreement with the experiment. Actually, this coordinate system with the center of mass of the earth as the origin is the same as the coordinate system with the ether wave-packet of the earth as the reference frame.

What the special theory of relativity discusses is the inertial motion, which regards the distribution of ether density as the uniform, or there is not gravitational field. There are some paradoxes that are difficult to be solved in special relativity because it neglects its material basis ether. The relativity takes the ether as a "space-time matter" actually, it so-called uniform space-time is just the uniform distribution of ether in quantitative description, which means that if two persons A and B are in relative motion with velocity v, then the A believes that the ether density is P everywhere; while the B considers that the ether density is Q everywhere, then P=Q. Nevertheless, even if the distribution of ether is uniform originally, it is P≠Q because the compressibility of the ether, which is an origin causing the paradoxes. The general theory of relativity regards further the change rate of ether density as the curvature of time-space, which is practicable as a way of mathematical description, but it is probable that leads to errors if thus a description is considered that reflect the truth of things because there are discrepancies between absolute and quantitative descriptions.

In addition, there are certain approximation in relativity. In the past, the cosmological principle was used to derive the Lorentz transformation intentionally or unconsciously. The meaning of cosmological principle is that the universe is homogeneous and isotropic, which ensures that the Lorentz transformation is linear [17], and also leads up to his approximation because time and space is closely related to object in relativity, and the cosmological principle can only be a large range of statistical approximation. In fact, the derivation of the Lorentz transformation by means of fluid mechanics in this book also shows the approximation of the relativistic formulas because the formula (2) is linearized, which means that it is conditioned and approximate, and it is correct only in the ether as a complete superfluid. The superfluid would have a certain critical speed, critical density, critical pressure and so on. The ether density can vary with the velocity, and would lose his superfluidity when it is risen certain height, and thus, the relativistic formulas will be no longer effective. Actually, Einstein said: "For the large field density and the material density, field equations and the field variables in these equations would not have the true mean. Overall, need a clear understanding that the equations must not be extended to this region." [25] Also we point out that the relativistic mass is corresponds to the tiny increment of ether density and the relativistic energy is corresponds to the tiny increment of ether pressure. Those indicate that the theory of relativity is ineffective for the dense and huge heavenly body or superluminal.

10. Conclusions

As indicated above, Absolute space-time theory is a scientific abstract, where the ether is a compressible superfluid, whose density field is the gravitational field, and a change in its density causes a change in the actual space-time standard, and thus, relativistic quantitative effects occur. The relativity, which is a quantitative theory with light as the measure of space-time, made up the shortcoming of absolute space-time theory in quantity. Nevertheless as absolute space-time theory sees it, the relativity, which regards the change of the actual space-time standard as the change of space-time itself, is a practicable mathematical model. There are certain discrepancies, corresponding relationships and complementarities between the absolute and quantitative descriptions. The relativity is quite effective when the increment of ether density is tiny, or the velocity of a body is lower than light velocity; and it is ineffective for the dense and huge heavenly body or superluminal.

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