

The Theory of Relativity - Misinterpretation of the Lorentz Transformation and Non-Existence of Equivalence Principle

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Abstract

The Lorentz Transformation (LT) equations were invented to make the speed of light constant (invariant) in reference frames moving with constant velocity relative to each other, which was implied by Maxwell's equations. This required the counterintuitive idea of relativity of length and time. The mainstream physics community just accepts this as the way nature works, while many reject it outright. Even more confusing is that the predictions of LT have been confirmed experimentally, such as the gamma factor, the electric field of moving charges and the universal light speed limit. On the other hand, absolute motion has also been decisively detected by many experiments such as the Miller, the Marinov, the Silvertooth, the Roland De Witte and the CMBR experiments. The speed of light has also been shown to vary with observer velocity, experimentally. All these facts show that the true nature of motion and the speed of light is still a mystery. In this paper, errors in the theory of Special Relativity, the non-existence of equivalence principle of General Relativity theory, and solutions will be proposed. The source of all confusions surrounding the LT is as follows: it has been wrongly presumed that the postulate of the constancy of the speed of light applies both to the phase velocity and the group velocity. We propose that it is the phase velocity, not the group velocity, which is constant independently of source or observer velocity. The group velocity behaves in a more conventional way: it is independent of source velocity but varies with observer velocity. The relativity of length and time required to keep the *phase* velocity constant should be thought as an artifact and not real. LT should be applied only to predict the outcome of light speed experiments involving *phase* velocity such as the Doppler effect. The counterintuitive constancy of the *phase* velocity of light is something we should just accept as a law of nature. It is rooted in the reality that there is no medium of propagation for light waves. It is much better to just accept the constancy of the phase velocity of light without interpreting this to mean reality of relativity of length and time, and this is supported by logic and experimental evidence. LT should be interpreted to explain why all observers see the *same* fringe shift, not necessarily a *null* fringe shift. This paper also shows that the beautiful thought experiment of the equivalence principle turns out to be wrong. The equality of inertial mass and gravitational mass has its root in two of the longstanding mysteries in physics: what inertial mass *is* and what gravity *is*. Inertial mass and electrical self inductance are not only analogous, but are fundamentally the same phenomena. The velocity of a car cannot change instantaneously for the same reason that the current inside an inductor cannot change instantaneously. Just as the magnetic field of an inductor cannot change instantaneously, so does the magnetic field of the electrons, protons and neutrons of the car material. Gravity and electrostatic force are not only analogous, but are fundamentally the same phenomenon. Gravitational force is a slight difference between electrostatic attractive and repulsive forces. It follows that both inertial mass and gravitational mass depend on the same quantity: the *total* (not net) amount of charge in an object.

Introduction

The nature of motion and the speed of light has confused physicists for centuries. Many conventional and modern light speed experiments have been carried out over centuries that gave results that defy any of existing theoretical frame works: the Special Theory of Relativity (SRT), the ether theory, the emission theory and all their variants. Physics today is in a situation in which each of these theories have their own supporting experimental evidences.

The Argo and Airy star light refraction experiments disprove the emission theory but do not support the ether theory exclusively either. The Michelson-Morley experiment clearly supports the emission theory by its null results. The emission theory has also other supporting experimental evidences: the Venus planet radar range data anomaly (as pointed out by Bryan G Wallace) and the Lunar Laser Ranging experiment.

But moving source experiments and the Sagnac effect support ether theory and disprove emission theory. There are many experiments that have decisively proved our absolute translational motion in space such as the Miller, the Marinov, the Silvertooth, the CMBR and the Roland De Witte experiments. Even crucial is the fact that sidereal correlations have been detected in these experiments.

Other experiments also exist that do not decisively prove or disprove the ether or the emission theory. These may include the Bradley stellar aberration experiment and the Ole Roamer experiment.

This author has already proposed a theory called Apparent Source Theory (AST) [1] that successfully reconciles many of the above contradicting experimental facts. AST turns out to be a novel way of fusion of ether theory and emission theory.

However, there are modern experiments which appear to support the Special Theory of Relativity (SRT). These are the Ives-Stillwell experiment, the experiment on electric field of moving charges[2] and experiments on universal light speed limit and relativistic mass increase.

The universal light speed limit and relativistic mass increase have been partially explained in my previous paper[1][3]. However, there remained a class of experiments which I have been unable to explain, but which are explained successfully by SRT. The confusing problem is: how can SRT explain some experiments correctly if it is wrong ?

The mystery turns out to be that I have always (perhaps wrongly) rejected the Lorentz Transformation (and SRT) outright. This is because of the counter intuitive idea of relativity of length and time. However, I have been eventually forced to consider the Lorentz Transformation because I arrived at the conclusion that it correctly predicts the outcome of some experiments. These are the limiting light speed experiments, the relativistic mass increase experiments, the Ives-Stillwell experiment and the experiment [2] on electric field of moving charges. These experiments prove the validity of the gamma (γ) term of SRT, which is impossible to derive in any conventional way not involving the Lorentz Transformation.

The aim of this paper is to point out errors in the interpretation of Lorentz Transformation and to give a new interpretation and to disprove the equivalence principle based on existing experimental facts and theories already proposed by this author.

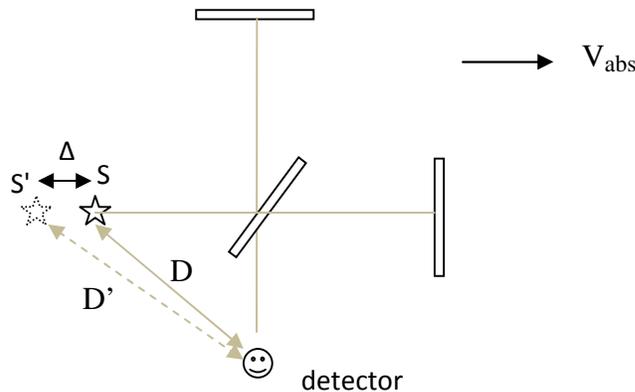
Apparent Source Theory

Apparent Source Theory[1] (AST) has already been proposed by this author to explain the Michelson-Morley experiment, the Sagnac effect, moving source experiments and many other experiments within a single theoretical framework. AST turns out to be a novel way of fusion of ether theory and emission theory. In this paper, we give a brief introduction to it.

We will present a new interpretation of absolute motion as follows.

The effect of absolute motion for co-moving source and observer is to create an apparent change in the position (distance and direction) of the light source relative to the observer.

With this interpretation, the Michelson- Morley and the Kennedy-Thorndike experiments can be readily explained.



From the above diagram of the Michelson-Morley experiment, we see that the effect of absolute velocity is just to create an apparent change of the position of the light source relative to the detector, for absolute velocity V_{abs} directed to the right.

The procedure of analyzing the Michelson-Morley experiment is:

1. Replace the real source S by an apparent source S' , to account for the absolute velocity
2. Analyze the experiment by assuming that the speed of light is constant relative to the apparent source S' .

The best way to understand the effect of this apparent change of source position is to ask:
what is the effect of actually, physically shifting the source from position S to position S' ?

Obviously there will be no (significant) fringe shift because, intuitively, both the longitudinal and lateral beams will be affected identically. It is possible to prove this experimentally in optics.

Therefore, in the present case, the apparent shift of the source is common both to the forward and lateral/transverse light beams and doesn't change the relative path lengths of the two beams and hence no significant fringe shift will occur or a very small fringe shift may occur.

Intuitive understanding of Apparent Source Theory - Modified Emission Theory

An intuitive approach to AST is to assume that the speed of light varies *relative to the source* so that it is constant independent of source velocity.

The null result of the Michelson-Morley experiment could be explained in a most straightforward way by the emission theory of light. However, the emission theory was abandoned because of moving source experiments. We will see that physicists hastened to reject the emission theory which turns out to be a crucial part of the true theory of the speed of light.

The trick of nature is as follows. The emission theory basically explains the Michelson-Morley experiment. However, for emission theory to be compatible with moving source experiments, the speed of light should vary *relative to the source* so that the speed of light is independent of the velocity of the source.

Imagine a light source in absolute motion and an observer at absolute rest. Suppose that the light source is moving with velocity V_{abs} towards the observer.



For the speed of light to be independent of the velocity of the source, the speed of light *relative to the source* should be $c - V_{abs}$ in the forward direction. Therefore, the speed of light relative to the observer will be the *sum* of source velocity (V_{abs}) and the speed of light relative to the source ($c - V_{abs}$):

$$V_{abs} + (c - V_{abs}) = c$$

For an observer who is at absolute rest behind a light source moving with absolute velocity V_{abs} , the velocity of light is $c + V_{abs}$ in the backward direction *relative to the source*.



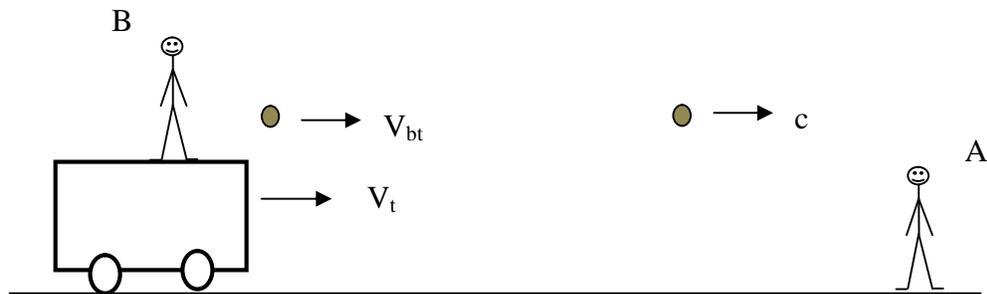
The speed of light relative to the observer will be the *difference* between the speed of light

relative to the source ($c + V_{\text{abs}}$) and the source absolute velocity (V_{abs}):

$$(c + V_{\text{abs}}) - V_{\text{abs}} = c$$

Therefore, we have shown that the speed of light is independent of the velocity of the source if we modify the conventional emission theory as above. This is a fusion of ether theory and emission theory. Note that the ether doesn't exist. By 'ether theory' we mean 'absolute motion theory' here. Although the ether doesn't exist (as disproved by the Michelson-Morley experiment), absolute motion does exist.

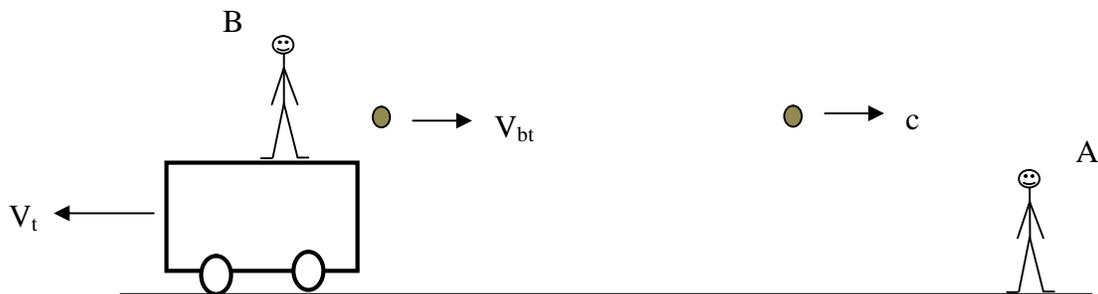
To draw an analogy, consider a stationary observer A and a cart moving relative to A. Another observer B is on the cart, throwing balls in the forward or backward direction while the truck is moving. Suppose the cart (and observer B) moves towards observer A with velocity V_t . The requirement is that observer B adjusts the velocity of the balls *relative to the truck* (V_{bt}) so that the velocity of the ball relative to the stationary observer is always constant c irrespective of the velocity of the cart.



$$V_t + V_{bt} = \text{constant} = c$$

If observer B throws balls towards observer A while the cart is moving away from the observer A, as shown below, the velocity of the balls relative to A will be the difference between V_t and V_{bt} , which is constant as above.

$$V_t - V_{bt} = \text{constant} = c$$



Therefore, the velocity of the balls relative to observer A is constant c independent of the velocity of the cart, analogous to the speed of light being constant c relative to an observer at absolute rest, independent of source velocity.

It is now easy to see the null result of the Michelson-Morley experiment (MMX) by the modified emission theory above. Modified emission theory is just conventional emission theory in which the velocity of light *relative to the source* depends on the absolute velocity of the source. Thus, in the MMX , a change in velocity of light *relative to the source* due to source absolute velocity will not result in a fringe shift because, intuitively, both the longitudinal and transverse light beams will be affected equally.

For a comprehensive description of AST the author recommends papers [5][6][7][8][9][10][11][12]

A new interpretation of Lorentz Transformation

The Lorentz Transformation (LT) was invented to keep the speed of light constant in reference frames moving relative to each other. LT was invented to explain the MMX null result. We have shown above that AST explains MMX in a much more natural and easy way. However, there are experimental facts that imply the validity of LT in correctly predicting the outcomes of some experiments. These include the universal light speed limit experiments, the relativistic mass increase experiments, experiment on the electric field of moving electron and the Ives -Stilwell experiment. Previously I proposed an alternative explanation for the Ives-Stilwell experiment ('Exponential Law of Doppler effect of light'); I have abandoned it because the LT can explain all the above mentioned experiments.

Up to the writing of this paper, I have always rejected the Lorentz Transformation (LT) because of its counterintuitive ideas of relativity of length and time, which is also against experimental evidence. However, eventually I am forced to consider it because LT correctly predicts the outcome of some experiments which cannot be explained in any conventional or other way not applying the LT.

The mainstream physics community just accepts the relativity of time and space (time and length) of LT as the way nature works, even though it is glaringly counterintuitive. Outside the mainstream, many reject it outright. In this paper, we provide a new interpretation of LT based on existing experimental facts and based on the fact that an alternative explanation exists to many light speed experiments. One of the arguments made in support for the Special Relativity theory has been the lack of competing alternative theories, i.e.

" if no competing alternative theory exists, then SRT must be true "

We have shown above that an alternative explanation (Apparent Source Theory) exists and therefore we are not bound to accept SRT (at least as it is). Also, absolute translational velocity has been decisively detected by the Miller, the Marinov, the Silvertooth, the CMBR and the Roland De Witte experiments. The variation of the velocity of light with observer velocity has

also been confirmed experimentally[4].

The new interpretation is as follows.

The constancy of the speed of light has been misinterpreted to mean the constancy of both the phase velocity and the group velocity. We propose here that it is the *phase* velocity, not the group velocity, that is constant c independent of source or observer velocity. The group velocity behaves in a more conventional way: the group velocity is independent of source velocity, but depends on observer velocity.

Therefore, LT applies only to experiments involving phase velocity such as the Doppler effect. The relativity of length and time (space and time) should be considered only as an artifact used to predict the outcome of experiments in which the phase velocity is relevant, such as Doppler effect. The constancy of the *phase* velocity of light is something that we should just accept, without requiring *reality* of relativity of length and time.

All we can say is:

The *phase* velocity of light is constant c independent of source or observer velocity. Thus, the phase velocity of light acts *as if* length and time are relative. This relativity of time and space is not real, only an artifact.

Therefore, space-time of SRT doesn't exist.

Experimental evidences against the conventional interpretation of Lorentz Transformation

The conventional interpretation is that the relativity of space and time are real and applies both to the phase velocity and group velocity of light, and not only to light but also to all physical systems. There are many experimental counter-evidences to this interpretation. Some of these are:

1. Experiments that detected our absolute translational velocity in space such as: the Miller, the Marinov, the Silvertooth, the CMBR and the Roland De Witte experiments
2. Experiments that detected variation of group velocity of light with observer velocity, by using lunar laser ranging experiment[4]

Unification of Apparent Source Theory and Lorentz Transformation

From the discussion so far there seems to be two explanations related to the Michelson-Morley experiment: Apparent Source Theory (AST) and Lorentz Transformation (LT). Since the phase velocity of light is relevant in the Michelson-Morley experiment (MMX), LT appears to explain the null result. We have also seen how AST can easily explain the null result of MMX. What is the relationship between the two theories ?

The mystery is as follows. The LT was originally invented to explain the MMX '*null*' result. It has always been presumed that the MMX (and any other experiment designed to detect absolute motion) will always give null results. However, this is not true as absolute translational velocity has been detected by different kinds of experiments, including the Miller, the Silvertooth, the Marinov and the Roland De Witte experiments.

Therefore, we unify AST and LT as follows. The role of the Lorentz Transformation is to explain that the *same experimental result* (the same fringe shift) will be obtained in different reference frames moving relative to the Michelson-Morley device. This is distinct from the prevailing view of '*the same null result*'. This means that if a fringe shift occurs in the reference frame of the MMX , LT ensures that the same fringe shift will be observed in all inertial reference frames moving relative to the MMX device. The question arises: what determines the fringe shift in the reference frame of the MMX ? The fringe shift in the reference frame of the MMX is determined by AST.

Suppose that the MMX device is at absolute rest, and hence no fringe shift according to AST. LT explains this null result in reference frames moving relative to the MMX device. Suppose now that the MMX device is set into absolute motion. AST predicts a fringe shift . LT explains that the fringe shift is the *same* in all inertial frames moving relative to the MMX device.

In summary:

AST determines *what* experimental result (a null or a non-null fringe shift) all observers observe.

LT ensures that all inertial observers observe *the same* experimental result.

The Equivalence Principle

The equivalence principle of General Relativity Theory (GRT) is usually considered as one of the most beautiful thought experiments in physics. It states that there is no way an observer in gravitational free fall in a closed room can know whether he/she is in free fall in a gravitational field or moving inertially in space free from gravitational fields. All the laws of motion is the same in both cases. It is also stated in another way as the equivalence of gravitation and acceleration. There is no way for an observer at rest on Earth in a closed room to know whether he is at rest in Earth's gravitational field or is accelerating in space free from gravitational field.

This thought experiment, for all its beauty, is wrong. This is because absolute motion exists, as detected by many experiments. If the observer in a closed box has a device that can detect absolute velocity, then he can know whether he is in gravitational field or in space free from gravitational field. The observer in free fall in Earth's gravitational field detects his acceleration as a continuous increase in absolute velocity, while the device of the inertial observer in free space shows constant absolute velocity. Likewise, the device of the observer at rest in Earth's gravitational field shows Earth's absolute velocity in space, which is constant in magnitude (about 390 Km/s) (let us assume constant direction for simplicity of argument), while the device of the observer accelerating in free space shows continuously changing absolute velocity.

Therefore, Einstein's thought experiment that an observer at rest in Earth's gravitational field will see the same bending of light seen by an observer in free space with corresponding acceleration is wrong. Einstein predicted this because he postulated the equivalence principle, because he was 'assured' that there is no other alternative explanation to the equality of inertial mass and gravitational mass. The observer accelerating in free space will see bending of light because his absolute velocity is continuously increasing, where as the observer at rest in Earth's gravitational field will not see any bending of light because his absolute velocity is constant. Likewise, the observer accelerating in free space will observe red shift where as the stationary observer on Earth does not observe any corresponding red shift.

Therefore, the equivalence principle and the General Theory of Relativity are wrong.

Equality of inertial mass and gravitational mass

Einstein developed the equivalence principle by starting from the well established phenomenon of equality of inertial mass and gravitational mass. At Einstein's time, and even today, there is no explanation in physics for this 'coincidence'. Einstein hoped that the equivalence principle would do away with this coincidence.

The mystery of equality of inertial mass and gravitational mass is rooted in the long standing mysteries in physics: what inertial mass *is* and what gravitation *is*. Einstein's theory doesn't explain what the origin of inertial mass is.

In paper[3], I have proposed that inertial mass is nothing but electromagnetic radiation reaction. The inertial mass of a car is due to the radiation reaction of all the electrons, protons and neutrons of the materials of the car. Electrical self inductance and inertial mass are not only analogous, but are fundamentally the same phenomena. The current in an inductor cannot change instantaneously because the magnetic field cannot change instantaneously. In the same way, the velocity of a car cannot change instantaneously because the magnetic field of its electrons, protons and neutrons cannot change instantaneously.

A question arises: how can cars (which are neutral) radiate electromagnetic waves ? What about neutrons, which are also neutral ? The answer is that an electron and a proton bound in the materials of an accelerating car radiate identically to free electrons and protons. A neutron in an accelerating car will also radiate electromagnetic waves because it is made of charged elementary particles. It follows that the inertial mass of an object depends on the *total* (not net) amount of positive and negative charges contained in the object.

Gravitational force has been proposed as a slight difference between electrostatic attractive and repulsive forces[3]. Therefore, gravitational mass of an object also depends on the *total* amount of charges in the object.

Since both inertial mass and gravitational mass of an object depend on the *total* amount of charges in the objects, it follows that two bodies that have equal inertial masses will also have equal gravitational masses.

General Relativity

The General Theory of Relativity is wrong because:

1. the Special Theory of Relativity (SRT) is wrong. Since space-time of SRT doesn't exist, space-time wrapping of GRT doesn't exist also.
2. the equivalence principle is wrong (does not exist)
3. an alternative theory of gravity exists: gravity is a net electrostatic force.

Experimental confirmations of General Relativity ?

Now we raise an open question.

It is said that experiments have confirmed GRT to high precision[13]:

1. gravitational red shift (the Pound-Rebka experiment)
2. deflection of light by the Sun
3. Shapiro delay

Mercury perihelion advance was successfully explained by Paul Gerber before Einstein by assuming finite (light) speed of gravity, which is consistent with AST [1]. According to AST gravity acts as if it has infinite speed and light speed at the same time: dual nature!

How is it possible for a wrong theory to predict the outcome of experiments with such precision?!

Conclusion

From experimental and theoretical evidences, we have shown in this paper that the Lorentz Transformation (LT) (relativity of length and time) applies only to *phase* velocity of light. LT applies only to explain the outcome of experiments in which *phase* velocity light is relevant, such as Doppler effect of light. LT also correctly predicts the electric field of moving charges. LT doesn't apply to the group velocity of light and to physical systems. Spacetime of SRT doesn't exist except as an artifact in analyzing light speed experiments in which the phase velocity of light is relevant. Therefore, SRT has at least something to do with nature. On the contrary, GRT has nothing to do with nature because: 1. the equivalence principle is wrong, 2. spacetime doesn't exist and 3. a compelling alternative theory of gravity is shown to exist: gravity is a net electrostatic force. However, an open question is: if GRT is wrong, how can its predictions such as gravitational red shift, bending of light in a gravitational field and Shapiro delay be experimentally confirmed with the reported precision[13]?

Thanks to God and the Mother of God, Our Lady Saint Virgin Mary

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* The section on Doppler effect of the paper need to be corrected according to the new findings of the current paper.