Speed of Light = 0,

―So "Proven" by Special Relativity, Indisputably!

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Abstract Mathematical verification according to the guidelines emphasized in the original paper of t*he theory of special relativity* (the TSR) published in 1905 shows that the TSR forces the appearance of *c=0* for speed of light. Such an outcome can only suggest that the TSR rejects its own second postulate, the absolute lifeline of the TSR. Rejecting this lifeline, the TSR must end up as being self-refuted. The TSR fundamentally relies on the following equation set for its calculation development:

(1) An equation set describing the relative movement between two inertial frames, which are moving with respect to each other at speed ***v***

$$\begin{aligned} x' &= a_{11}x + a_{12}y + a_{13}z + a_{14}t \\ y' &= a_{21}x + a_{22}y + a_{23}z + a_{24}t \\ z' &= a_{31}x + a_{32}y + a_{33}z + a_{34}t \\ t' &= a_{41}x + a_{42}y + a_{43}z + a_{44}t \end{aligned}$$

(2) An equation set of two spheres

$$\begin{aligned} x^2 + y^2 + z^2 &= c^2t^2 \\ x'^2 + y'^2 + z'^2 &= c^2t'^2 \end{aligned}$$

Advocating its second postulate, the TSR conceives these two equations indifferently representing the same single and only light sphere in space for its entire derivation if the sphere is created at where the origin of the two frames meets, i.e. ***x=x'=0*** at time ***t=t'=0***. As such, these two equations must further require that the observer on each of the frame necessarily sees the center of the light sphere permanently coincide with the origin of his own frame. Now, a question inevitably surfaces up: What enables the coinciding seen by each observer to continue for all time ***t*** *>0* and ***t'*** >0 if the two origins must move away from each other at a nonzero speed ***v***?

Although the first equation set as an exact form is not found in the original paper of the TSR published in 1905, the idea of the TSR fully warrants the mathematical legitimacy of the establishment of this set. It is merely a simplified mathematical language in place of the corresponding lengthy ambiguous verbal description in the original paper. This set does help relativity gain more popularity in understanding its derivation.

Key Words Lorentz factor**,** speed of light, moving length, rest length.

In studying the propagation of light with respect to some inertial frame at movement, the theory of special relativity (TSR) establishes the following equation set:

$$
\begin{aligned}
x' &= a_{11}x + a_{12}y + a_{13}z + a_{14}t \\
y' &= a_{21}x + a_{22}y + a_{23}z + a_{24}t \\
z' &= a_{31}x + a_{32}y + a_{33}z + a_{34}t \qquad \text{(Eq. 1 a-d)} \\
t' &= a_{41}x + a_{42}y + a_{43}z + a_{44}t
\end{aligned}
$$

The TSR considers that the correspondence between all the coordinates in (Eq. 1a-d) of any two inertial moving frames must obey the second postulate: Light invariably propagates at a constant speed ***c*** with respect to each of the two systems in space. This second postulate thus demands that all ***a'***s in (Eq. 1a-d) cannot be constants, but must be variables like the coordinates (***x, y, z, t***) and (***x', y', z', t'***), where ***x, y, z, x', y'*** and ***z'*** are spatial coordinates, ***t*** and ***t'*** are temporal coordinates. The TSR thus sets its objective, which is to pursue the solution of all the ***a'***s.

The TSR assumes a nonzero speed ***v*** between the two frames but also virtually confines this speed to be measured against the **X** and **X'** axes in its derivation. With many supplemental conditions (omitted here),), (Eq. 1a-d) finally boils down to the following set:

$$x' = a_{11}(x - vt) \qquad (Eq. 2a)$$

$$t' = a_{41}x + a_{44}t \qquad (Eq.\ 2b)$$

If all ***a'***s remain unknown but (*x, x', t, t'*) are treated as if they are constants, (Eq. 2a, b) is a set with three unknowns but only two relevant equations, and therefore unsolvable. However, the TSR reckons that the second postulate contains information concerning the relationship between the coordinates (*x, x', t, t'*) and the speed of light, ***c***, and would therefore render at least one relevant equation to help make (Eq. 2a, b) solvable. For this, it brings (Eq. 2a, b) into the realm describing by the following two spherical equations:

$$
\begin{aligned}
x^2 + y^2 + z^2 &= c^2t^2 \\
x'^2 + y'^2 + z'^2 &= c^2t'^2 \qquad \text{(Eq. 3 a, b)}
\end{aligned}
$$

The realm described by (Eq. 3a, b) is the space occupied by the propagation of light. Each equation in (Eq. 3a, b) is supposed representing one sphere that is independent of the other. However, the TSR believes, if these equations are used for describing the moving behavior of light, which forms a sphere that is created at ***x=x'=0*** and ***t=t'=0*** when the two origins meet, the second postulate must merge both spheres to act as one. Indeed, a visual picture that these two equations represent the same sphere of light is found to be affirmed in the original paper of relativity published in 1905 [1] . As such, inevitably, destined by relativity's imagination, the observer on each inertial frame must see the origin of his own frame *permanently* coinciding with the center of this sphere. This view of coinciding is so destined because of the way that the two equations is written: neither observer has been allowed to detect a relative movement between himself and the center of the sphere, but both observer must see the creation of this sphere at (*x=y=z=0, t=0*) and (*x'=y'=z'=0, t'=0*).

Since only the movement of the **X** axis and the **X'** axis matters to the derivation, the useful information in (Eq. 3a, b) actually only contains

$$x^2 = c^2 t^2$$

$$x'^2 = c^2 t'^2 \qquad \text{(Eq. 4 a, b)}$$

In its pursuance of the solution set for (Eq. 1 a-d), but actually for (Eq. 2 a, b), the TSR would first form a sub equation set containing (Eq. 2a, b) and (Eq. 4b) [2]. After *x'* and *t'* are eliminated in this sub equation set, whatever terms thus remained would be used for term comparison with (Eq. 4a). Then, relativity obtains its solution set, which includes $a_{11} = a_{44} = 1\Big/\sqrt{1-(v/c)^2}$, the so called *Lorentz factor*. In such a calculation procedure, what the TSR has done is actually forcing the formation of an over-conditioned equation set that reads

$$x' = a_{11}(x - vt)$$

$$t' = a_{41}x + a_{44}t$$

$$x^2 = c^2 t^2 \qquad \text{(Eq. 5a-d)}$$

$$x'^2 = c^2 t'^2$$

No solution derived via an over-conditioned equation set should be allowed to escape back-checking verification before it is accepted as valid. Such back-checking work does not appear having ever been done since the debut of the TSR. If the second postulate is the principle that guides the derivation for TSR to arrive at its solution, the second postulate should also serve as the most authoritative guiding principle in such back-checking verification. Moving state variation for inertial frames is the topmost concern in the study displayed by the TSR; the indispensable element in expressing moving state is speed, which must have length and time involved. Now, let us examine how the second postulate leads the TSR to formulate the relationship between length, time and speeds. For this, we found that, in a paragraph in *§2* of the relativity original paper published in 1905, the following guideline is detailed [3]

> *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. Taking into consideration the principle of the constancy of the velocity of light we find that*
>
> $$t_B - t_A = \frac{r_{AB}}{c - v} \qquad \text{(Eq. Re-A, for the ray and rod moving in the same direction)}$$
>
> *and* $$t'_A - t_B = \frac{r_{AB}}{c + v} \qquad \text{(Eq. Re-B, for the ray and rod moving in opposite direction)}$$
>
> *where r_{AB} denotes the length of the moving rod—measured in the stationary system.*
>
> [Both <u>Eq. Re-A</u> and <u>Eq. Re-B</u> and the comments inside the parenthesis are notes from this author]

Following the above quoted paragraph, let's imagine we have two parallel axes moving at speed ***v*** with respect to each other. When the two origins of the axes meet, a light sphere is emitted at $t=t'=0$ (Fig. 1). If the observer staying at the origin of the **X'** axis inspects the moving state of his own frame, he would of course gets speed ***v***=0 for the relative movement between him and his axis. With ***v***=0, when he looks at both the positive and negative directions, he would find that, ever since the light sphere is created at the origin and at the instant $t'=0$, the length covered by the rays of light on this axis match what (Eq. Re-A) and (Eq. Re-B) predict at any instant $t'>0$, i.e.

$$r_+ = r_- = ct' \qquad (Eq.\quad 6)$$

where time ***t'*** is quoted from a clock resting on the **X'** axis, while r_+ is the length of the part of the axis covered by the ray of light in the "+" direction, and r_- , in the "—" direction. Both r_+ and r_- are to him the so called rest length, a concept brought up by the TSR. (Eq. 6) thus leads to

$$\frac{r_+}{r_-} = 1 \qquad (Eq.\quad 7)$$

To the observer staying on the **X** axis, after a light sphere is created at $t=0$ at the origin of his axis, besides seeing light rays covering in both the positive and negative direction on the **X'** axis, he would also see the movement of the **X'** axis with a nonzero speed ***v*** with respect to his **X** axis. Looking at the positive direction, he must say that both the **X'** axis and the tip of the light ray are moving in the same direction. While looking at the negative direction, he must say that the **X'** axis and the tip of the light ray are moving in opposite direction between each other. Both tips starts at $x=0$ at the instant $t=0$ that is registered by a clock resting on the **X** axis.

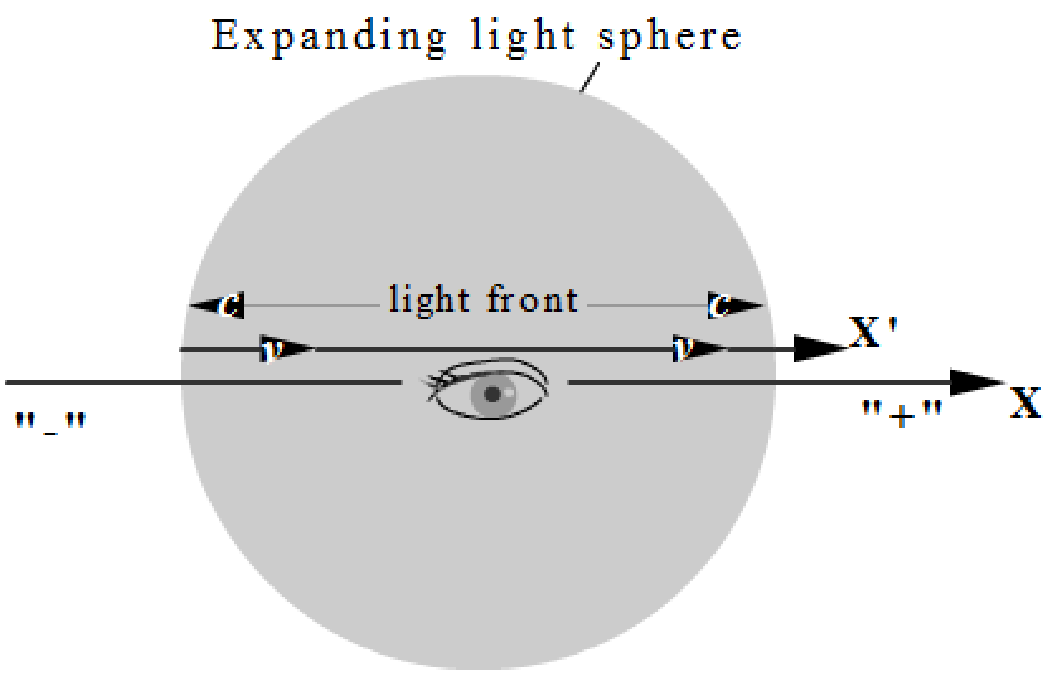

Fig. 1

For the light and the axis that an observer sees moving in the same direction, the previously quoted paragraph tells him that the relationship between distance, time, and speed should be established according to (Eq. Re-A), and therefore he gets

$$\frac{r'_{+}}{c-v} = t \qquad (Eq. \quad 8)$$

where time $\boldsymbol{t} \geq 0$ is quoted from the same clock resting on the **X** axis, while r'_{+} is the length of the part of the **X'** axis covered by the ray of light starting from *x=0* and ***t****=0* and moving in the "+" direction. No need to explain, r'_{+} is a moving length to him.

For the light and the axis that the observer sees moving in opposite direction, (Eq. Re-B) enables this **X** observer to get

$$\frac{r'_{-}}{c+v} = t \qquad (Eq. \quad 9)$$

where r'_{-}, also seen as a moving length by the **X** axis observer, is the part of the **X'** axis covered by the ray of light traveling in the "—" direction in the inspection made by the same observer.

Time ***t*** must bridge (Eq. 8) and (Eq. 9) together and leads to, after term rearrangement:

$$\frac{r'_{+}}{r'_{-}} = \frac{c-v}{c+v} \qquad (\,Eq. \quad 10)$$

Because of (Eq. 7) and (Eq. 10), the following relationship inevitably appears

$$1 = \frac{r_{+}}{r_{-}} = \frac{r_{+}\sqrt{1-\left(\frac{v}{c}\right)^2}}{r_{-}\sqrt{1-\left(\frac{v}{c}\right)^2}} = \frac{r'_{+}}{r'_{-}} = \frac{c-v}{c+v} \qquad (Eq. \quad 11)$$

In (Eq 11), rest lengths and moving lengths are seamlessly bridged and converted by the Lorentz factor advocated by the TSR. That the moving length must be observed as shorter than the rest length is one critically important concept stressed by the TSR. However, (Eq. 11) can be satisfied only if ***v****=0*; any nonzero value of ***v*** must fail this equation. Speed ***v****=0* is a plain statement that the introduction of **ONE** sphere of light, although represented by two different equations, to make (Eq. 1a-d) solvable implicitly forces the equation set to be solved with one predetermined condition, which is that the two inertial frames under study must be motionless with respect to each other.

Since (Eq. 5a) is supposed to enable us to study the movement of the origin of the **X** axis, where *x=0*, with respect to the **X'** axis, we naturally have

$$x' = a_{11}(0 - vt) \qquad (Eq. \quad 12)$$

However, in the same set of equations, (Eq. 5d) gives *x'=ct'*. Then, (Eq. 12), with the implicit condition $\boldsymbol{v}=0$, inevitably becomes

$$ct' = a_{11}(0 - 0t) = 0 \qquad (Eq. \quad 13)$$

(Eq. 13) forces that *c*, **the speed of light, must be *zero*** for all $t' \neq 0$.

The immediate consequence of *c=0* is that **relativity rejects its own second postulate,** which stresses that speed of light is a nonzero constant with respect to any inertial frame. Rejecting the second postulate is an indisputable evidence that the theory of special **relativity refutes itself**.

As a matter of fact, with *c=0*, relativity forces a zero value in the denominator in the Lorentz factor $1 \Big/ \sqrt{1 - (v/c)^2}$, violating one utmost important principle in mathematics. So, how valid a concept is the Lorenz factor in physical study? Should the science world continue to wonder why so many paradoxes can be imagined dancing around the theory of special relativity since its debut?

References:

[1] *At the time $t = \tau = 0$, when the origin of the coordinates is common to the two systems, let a spherical wave be emitted therefrom, and be propagated with the velocity c in system K. If (x, y, z) be a point just attained by this wave, then $x^2 + y^2 + z^2 = c^2t^2$. Transforming this equation with the aid of our equations of transformation we obtain after a simple calculation $\xi^2 + \eta^2 + c^2 = c^2\tau^2$. The wave under consideration is therefore no less a spherical wave with velocity of propagation c when viewed in the moving system.* Page 46, **THE PRINCIPLE OF RELATIVITY**, Dover Publications, Inc., 1952; Standard Book Number: 486-60081-5; Library of Congress Catalog Card Number: A52-9845

[2] Introduction to Special Relativity, Robert Resnick, John Wiley & Sons, Inc. 1968, Library of Congress Catalog Card Number: 67-31212

[3] Page 42, **THE PRINCIPLE OF RELATIVITY**, Dover Publications, Inc., 1952; Standard Book Number: 486-60081-5; Library of Congress Catalog Card Number: A52-9845