Relativity Is Self-Defeated

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Abstract A signature conclusion from Albert Einstein's relativity is that nothing in the universe can travel at speed exceeding the speed of light. This conclusion, however, must be destroyed by its own signature equation—the length contraction equation, in a few lines of algebraic operation. Following this lead, people will find that the entire derivative work of relativity is done within the forbidden zone of mathematics.

Key Words speed limit, speed of light, diameter of the Milky Way, length contraction, textbooks on relativity

Introduction Here is the length contraction equation from relativity:

$$L = L'\sqrt{1-\left(\frac{v}{c}\right)^2} \qquad (Eq.\quad 1)$$

where *L'* is a stationary length, *L* is the moving length concluded by a stationary observer who sees *L'* moving at speed *v*, and *c* is the speed of light. If *L=0.8 light-year*, Eq. 1 must lead to *L'=1.3333 light-year*. If, in his entire observation, **only the clock next to him is used for time (=*t*) registration**, he will further have

$$\frac{L}{t} = \frac{L'}{t}\sqrt{1-\left(\frac{v}{c}\right)^2} \qquad (Eq.\quad 2)$$

Replacing L/t with *v* and L'/t with *v'*, he has

$$v = v'\sqrt{1-\left(\frac{v}{c}\right)^2} \qquad (Eq.\quad 3)$$

If *v=0.8c*, Eq. 3 must lead to ***v'=1.3333c > c***.

Indeed, any speed value *v* in the range $\sqrt{2}c/_2 < v < c$ must lead to *v'>c*.

A scenario that would interpret Eq. 3 into daily experience, if relativity is correct, can be devised as being described in the following:

A captain of an extremely long space vessel, with a clock next to him, adjusts the speed of his vessel so that the Milky Way is passing it at speed of

$$v = \frac{10^5 \times (3600 \times 24 \times 365)}{\sqrt{1 + [10^5 \times (3600 \times 24 \times 365)]^2}} \cdot \frac{(3 \times 10^5)km}{sec}$$
$$= \frac{10^5 \times (3600 \times 24 \times 365)}{\sqrt{1 + [10^5 \times (3600 \times 24 \times 365)]^2}} \cdot c \qquad (Eq. \quad 4)$$

Then, Eq. 1 will lead him to see the diameter of the Milky Way, which, when stationary, is $L' = 10^5\ ly$, to be seen as *1 ls*, where *ly* is the abbreviation of *light-year, ls* the *light-second*. Subsequently, with the time of **one second** registered by his clock, relativity would enable him to zap across the diameter of the Milky Way from end to end. It means that the speed sends him so traveling is $10^5 \times (3600 \times 24 \times 365)c$. This is a plain statement that relativity's speed limit of *c* is led to non-existing by relativity's own equation.

How has the above mathematical failure been developed and be able to escape the scrutiny of so many science workers for more than one century? The answer lies in the mystery that is brought up by the so called **Lorentz factor**

$$\sqrt{1 - \left(\frac{v}{c}\right)^2}$$

Near the end of this article, this Lorentz factor is exposed being an illegitimate expression in mathematics, because an inevitable value of ***c=0*** is found in the denominator inside the square root. Such exposure is done by the combination work of textbooks teaching relativity and the guidance found from the original paragraphs of relativity published in 1905.

Because of the mathematical illegitimacy of the Lorentz factor, this author believes that the science world must pay serious attention to review the acceptance of some concept in physics, such as *ct* or *ct'* as the fourth dimension of the universe and the so-called light-cone following this fourth dimension fantasy.

Mathematical Development

Normally, a textbook will begin its mathematical deduction with the following equation set:

$$\begin{aligned} x' &= a_{11}x + a_{12}y + a_{13}z + a_{14}t \\ y' &= a_{21}x + a_{22}y + a_{23}z + a_{24}t \\ z' &= a_{31}x + a_{32}y + a_{33}z + a_{34}t \\ t' &= a_{41}x + a_{42}y + a_{43}z + a_{44}t \end{aligned} \qquad \text{(Eq. 5 a-d)}$$

The task of Eq. 5a-d is to find all *a'*s as unknowns while all *t'*s, *x'*s, *y'*s, *z'*s are given the status as if they had been constants. With many supplemental conditions, Eq. 5a-d finally boils down to

$$\begin{aligned} x' &= a_{11}(x - vt) \\ y' &= y \\ z' &= z \\ t' &= a_{41}x + a_{44}t \end{aligned} \qquad \text{(Eq. 6a-d)}$$

If all *a'*s remain as unknowns, Eq. 6a-d is a set with three unknowns but only two relevant equations, and is then unsolvable. To overcome the difficulties, the textbooks introduce new information with

$$\begin{aligned} x^2 + y^2 + z^2 &= c^2t^2 \\ x'^2 + y'^2 + z'^2 &= c^2t'^2 \end{aligned} \qquad \text{(Eq. 7a, b)}$$

Given that $y'=y$ and $z'=z$ are redundant and they eventually reduce to zero, the useful information in Eq. 7a, b actually only contains

$$\begin{aligned} x^2 &= c^2t^2 \\ x'^2 &= c^2t'^2 \end{aligned} \qquad \text{(Eq. 8a, b)}$$

Putting everything together, the textbooks come to an equation set that reads

$$x' = a_{11}(x - vt)$$
$$t' = a_{41}x + a_{44}t$$
$$x^2 = c^2t^2 \qquad \text{(Eq. 9a-d)}$$
$$x'^2 = c^2t'^2$$

The introduction of Eq. 7a, b, or equivalently, the introduction of Eq. 8a, b makes it indisputable that Eq. 9a-d is conditioned to be solved in the following way: No matter how time develops, each observer must see that the origin of one's own axis and the center of the light sphere coincide forever in each observer's inspection.

Mathematically, the introduction of Eq. 7a, b is to say that the spherical space occupied by the light starts its expansion at *t=t'=0*. As far as each of the **x** axis and **x'** axis is concerned, light must propagate along them in both the positive and negative directions with speed of equal absolute value, which is *c*. Therefore, in the inspection of the **x** observer, he must say that the **x'** axis and the light front both move in the same direction pointing toward the positive end of his **x** axis. Looking toward the negative end, he must say that the light front and the **x'** axis move in opposite direction between each other. Distance between the light front and a certain point on the **x'** axis, such as the origin, certainly continuously changes in his inspection. How would relativity guide the observer to calculate such distance change in the identical situation? Here is a quoted paragraph from *§2* of the Relativity paper of 1905:

"*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*

$$t_B - t_A = \frac{r_{AB}}{c - v} \qquad \text{(Eq. Re-A, for the ray and rod moving in same direction)}$$

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 Eq. Re-A and Eq. Re-B and the comments inside the parenthesis are notes from this author]

In this quoted paragraph, right at the very moment of emission of the ray, the location on the stationary system where point ***A*** matches must be seen by relativity as where the light source of the ray is or as the center of a light sphere occupied by all rays moving in all isotropic directions. Among all these rays, the ray in our calculation is only one of them. Such center will not move with the moving rod in the inspection of the stationary observer; it is so mandated by

Eq. 7a. The quoted paragraph further tells us that for the light and the axis that an observer sees moving in the same direction, relativity will set up the relationship between distance, time, and speed according to (Eq. Re-A). If they are moving in opposite direction, the same observer should set up their relationship according to (Eq. Re-B). In both situations, time is quoted from a clock next to the stationary observer.

Therefore, coming back to our equation set, seeing the movement in the same direction for the light ray and the **x'** axis, guided by (Eq. Re-A), the **x** observer will obtain a distance r'_+ on the x' axis such that

$$\frac{r'_+}{c-v} = t \qquad (Eq. \quad 10)$$

where *t* is the amount of time that the ray requires to cover r'_+, starting from *t=0*, of course, and registered by the clock next to the **x** observer.

For the movement in the opposite direction, this observer will obtain a distance r'_- covered by the light traveling on the **x'** axis with the same amount of time *t* such that

$$\frac{r'_-}{c+v} = t \qquad (Eq. \quad 11)$$

Subsequently, this **x** observer must have

$$\frac{r'_+}{c-v} = t = \frac{r'_-}{c+v} \qquad (Eq. \quad 12)$$

or further

$$\frac{r'_+}{r'_-} = \frac{c-v}{c+v} \qquad (Eq. \quad 13)$$

Please note once again: In the inspection of the **x** observer, the center of the light sphere is not allowed to move with the origin of the **x'** axis, or the starting point of r'_+ or r'_-, which is equivalent to r_{AB} in (Eq. Re-A) and (Eq. Re-B). Eq. 7a and 7b mandate that this observer must be stationary to both his **x** axis as well as the light sphere center.

To the observer who is stationary to the **x'** axis, with *v=0* of his own frame with respect to himself, and with the center of the light sphere to be seen at a point equivalent to point A and to be motionless to him, (Eq. Re-A) and (Eq. Re-B) together require that he must see

$$r_+ = r_- = ct' \qquad (Eq. 14)$$

where r_+ and r_- are distances covered by the rays on his axis in each of the positive and negative direction, with *t'* being quoted from a clock from his **x'** axis.

Eq. 14 thus leads to

$$\frac{r_+}{r_-} = 1 \qquad (Eq. 15)$$

Then, because of Eq. 1 listed in the Introduction, and also later because of Eq. 13, we are led to Eq. 16 as shown in following:

$$1 = \frac{r_+}{r_-} = \frac{r_+\sqrt{1-\left(\frac{v}{c}\right)^2}}{r_-\sqrt{1-\left(\frac{v}{c}\right)^2}} = \frac{r'_+}{r'_-} = \frac{c-v}{c+v} \qquad (Eq. \quad 16)$$

where r'_+ and r'_- are moving length seen by the **x** observer and correspondingly matching the stationary length r_+ and r_- concluded by the observer on the **x'** axis.

Eq. 16 can be satisfied only if *v=0*; no other value of *v* can satisfy it.

Now things are apparent: the treatment of introducing a sphere of light to make Eq. 1a-d solvable must only implicitly force the set to be solved with a predetermined speed value *v=0*. With *v=0* as an implicit condition being so forced in Eq. 1 a-d, a serious result immediately follows to dismantle the validity of special relativity. Let's go further with the help of Eq. 9a.

From Eq. 9a, we have

$$x' = a_{11}(x - vt) \qquad (Eq. 9 \quad a)$$

Naturally, to study the movement of the origin of the **x** axis, where *x=0*, with respect to the **x'** axis, we have

$$x' = a_{11}(0 - vt) \qquad (Eq. \quad 17)$$

With *v=0*, but also *x'=ct'* (from Eq. 9d), Eq. 17 leads to

$$ct' = a_{11}(0 - 0t) = 0 \qquad (Eq. \quad 18)$$

Consequently, $c=0$ is mandated by the most fundamental mathematical rule as an indisputable result from Eq. 18 whenever and wherever $t' \neq 0$ is found.

With *c=0* being inevitably forced by relativity itself, mathematical validity must not exist for any equation carrying the following factor, the so called Lorentz factor:

$$\frac{1}{\sqrt{1-\left(\frac{v}{c}\right)^2}}$$

We all know that equations carrying the above factor appear everywhere in relativity. Without this factor, there is no relativity; with this factor, where is the validity of relativity?

References:

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