International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Revisiting the Foundations: A Critical Analysis of the Special Theory of Relativity

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Abstract: ***This article presents a comprehensive critique of the Special Theory of Relativity by focusing on the fundamental aspects of the Lorentz transformation equations. Through a detailed examination of situations where a moving inertial reference frame approaches or recedes from a given point, the author, Dr. Hasmukh D Rathod, challenges the theory's core premises. By recalculating the Lorentz transformation for different scenarios, the paper argues against the concepts of time dilation, length contraction, and the four-dimensionality of space-time as posited by the special relativity. It suggests that the discrepancies in the Lorentz transformation calculations cast doubt on the entire framework of the theory, including its implications for the General Theory of Relativity and derived concepts such as Einsteins mass-energy equivalence equation. The author proposes a reevaluation of these foundational principles, calling for a reassessment of relativity's role in modern physics.***

Keywords: Special Theory of Relativity, Lorentz Transformation, Time Dilation, Length Contraction, Einsteins Mass-Energy Equivalence

1. Article

Here Special theory of the relativity is disproved as follows.

The backbone of the special relativity is the Lorentz transformation.

The Lorentz transformation equations are,

$$x' = \frac{x-vt}{\sqrt{1-\frac{v^2}{c^2}}}$$
$$y' = y$$
$$z' = z$$
$$t' = \frac{t-{xv}/{c^2}}{\sqrt{1-\frac{v^2}{c^2}}}$$

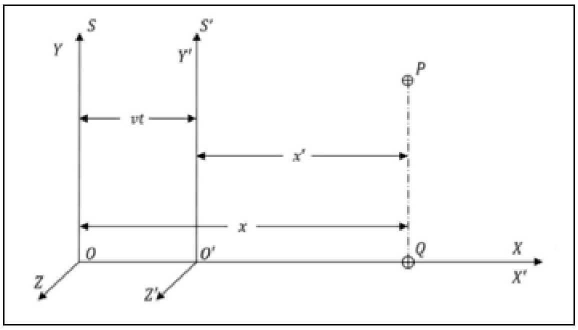


Figure 1

This equations are valid for situation shown in figure 1. Where Reference frame S′ is moving with uniform rectilinear velocity toward the observed point P. And in a time t, reference frame S′ moves a distance vt, toward P.

Co-ordinates of P in the S is (x, y, z, t).
Co-ordinates of P in S′ is (x′, y′, z′, t′)

Here there is no movement on Y or Z axis, so, co-ordinates of P will remain same and won't vary.

Relation of values according to Newtonian physics are,

$$x = ct$$
$$x' = x - vt$$

And

$$x = x' + vt$$

Relativistic relations due to its postulates are,

$$x' = \Upsilon(x - vt) \dots\dots\dots\dots\dots\dots (1)$$

And

$$x = \Upsilon(x' + vt') \dots\dots\dots\dots\dots\dots (2)$$

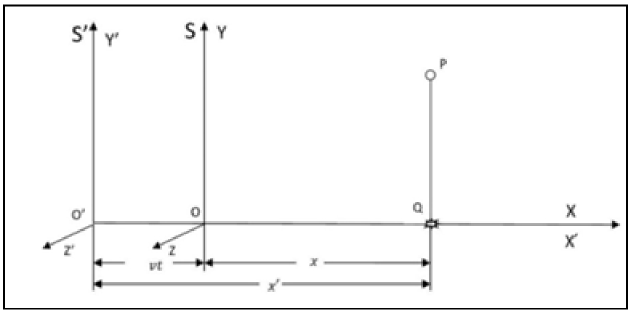
If we derive value of ϒ, then it will be,

$$\Upsilon = \frac{1}{\sqrt{1 - {v^2}/{c^2}}}$$

And equations will be as shown above.

This is according to Lorentz transformation, derived in a situation when moving inertial reference frame, moves toward the observed point P.

Now, Let's calculate transformation in a situation when moving inertial reference frame, moves away from the observed point P.



Relations, according to Newtonian physics are,

$$x = ct$$
$$x' = x + vt$$

And

$$x = x' - vt$$

Relativistic relations due to its postulates are,

$$x' = \Upsilon(x + vt) \ldots\ldots\ldots\ldots\ldots\ldots..(2.1)$$

And

$$x = \Upsilon(x' - vt') \ldots\ldots\ldots\ldots\ldots\ldots..(2.2)$$

If we derive value of ϒ, then it will be, Figure 2.

$$\Upsilon = \frac{1}{\sqrt{1 - {v^2}/{c^2}}}$$

And equations will be as shown below.

$$x' = \frac{x+vt}{\sqrt{1-\frac{v^2}{c^2}}},$$

$$y' = y$$

$$z' = z$$

$$t' = \frac{t + {xv}/{c^2}}{\sqrt{1 - \frac{v^2}{c^2}}}$$

This is transformation, derived in a situation when moving inertial reference frame, moves away from the observed point P.
And this represents, Time contraction and not Time dilation.

This will also lead to Length elongation and not length contraction.

Let's call,

$$\sqrt{\frac{1 + \frac{v}{c}}{1 - \frac{v}{c}}} = \Omega$$

If **time contraction** is Δt,

Then,

$$\Delta t = t' - t = t\Omega - t$$
$$= t(\Omega - 1)$$

$$\Delta t = t\left(\sqrt{\frac{1+\frac{v}{c}}{1-\frac{v}{c}}} - 1\right) \text{(here, } v < c\text{)}$$

This can also be shown with a photon clock type-2 example.

In Triangle ABC all angles are of 60˚.

Here is figure 3, showing photon clock type 2.

Here direction of light is from C to B point then from B to A.

Motion of clock is along the positive side of the X axis. l is height.

Here, t′ will be.

$$t' = t\left(\frac{-\frac{v}{c} +/- \sqrt{4 - 3\frac{v^2}{c^2}}}{2\left(1-\frac{v^2}{c^2}\right)}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(A)$$

here, $v \leq \frac{2c}{\sqrt{3}}$

If, **Length elongation** is Δl,

$$\Delta l = l - l_0$$

$$\Delta l = l_0\sqrt{\frac{1 + \frac{v}{c}}{1 - \frac{v}{c}}} - l_0$$

$$\Delta l = l_0\left(\sqrt{\frac{1 + \frac{v}{c}}{1 - \frac{v}{c}}} - 1\right)$$

$$\Delta l = l_0(\Omega - 1).$$

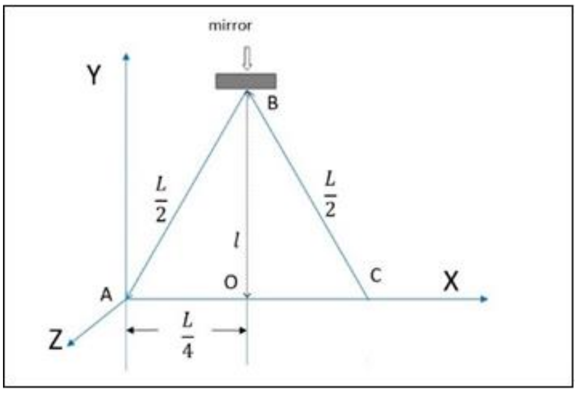


Figure 3: Showing photon clock type-2 diagram.

Now,

Proving that "Time is not the fourth dimension.

As shown in figure 4 here,
$ct_p = ct_q$, (Distance with speed c from O′ to Px and Qx)

$So, t_p = t_q$ let's call it t.

$$\therefore t_p' = \Upsilon t\left(1 + \frac{v}{c}\right) \;\&\; t_q' = \Upsilon t\left(1 - \frac{v}{c}\right)$$

Then,

$$\Upsilon t\left(1 - \frac{v}{c}\right) = \Upsilon t\left(1 + \frac{v}{c}\right)$$
$$\therefore 1 - \frac{v}{c} = 1 + \frac{v}{c}$$
$$\therefore -v = +v$$

This can only be true for the only one value v=0.

Let's put value v=0 in the value of the gamma.

$$\Upsilon = \frac{1}{1 - \frac{v^2}{c^2}} = \frac{1}{1 - 0} = 1$$

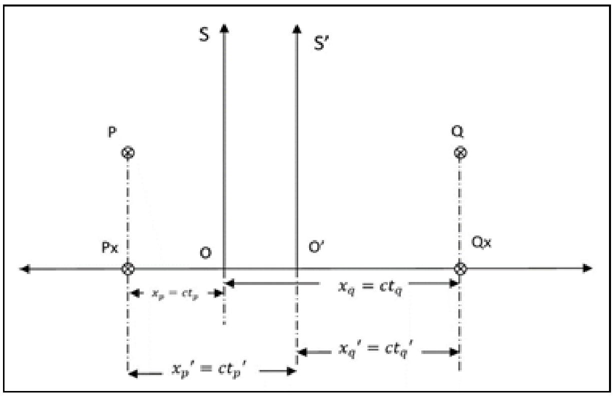


Figure 4

So, for these calculations to be true,
$\Upsilon = 1$.

Let's see the consequences for the special theory of relativity.

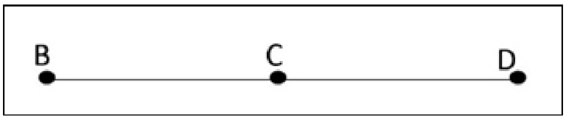


Figure 5

Here, in a figure 5,

There are three clocks B, C and D at three points. BC=CD.

C is a moving with uniform rectilinear velocity v away from the B and toward D in one line.

According to calculations shown above.

Clock C will show time dilation in relation to D because C is moving toward D.

So,
$t_c < t_d$. (t_c is the time in the clock C and t_d is the time in the clock D)

Now, clock C is moving away from the clock B.

So,
According to calculation shown in the chapter of time contraction, time will contract for C in relation to B.
$t_b < t_c$. (t_c is the time in the clock C and t_b is the time in the clock B)

So, relations are as follow,

$$t_b < t_c < t_d. \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (B)$$

But B is not moving in relation to D.

So,

$$t_b = t_d.$$

So, relation in the equation B is not possible.

Means postulate 2 of the special relativity creates consequences that are not competent with reality.

So, postulate 2 of the special theory of relativity cannot be true.

If transformations according to this theory don't give a consistent result, then the concept of time as a fourth dimension is not valid. The validity of the structure of Minkowski Four-dimensional space is also questioned.

The general theory of Relativity is based on the Lorentz transformation, so its validity has also been questioned.

2. Conclusion

In conclusion, this article presents a thought-provoking critique of the Special Theory of Relativity through a meticulous examination of the Lorentz transformation equations and their implications. Dr. Hasmukh D Rathod's analysis brings to light significant inconsistencies that challenge the validity of time dilation, length contraction, and the concept of space-time as the fourth dimension. By demonstrating that the foundational postulates of special relativity may not be held under certain conditions, this work invites the scientific community to revisit and scrutinize the core principles of relativity. The implications of this critique extend beyond the Special Theory of Relativity, prompting a reevaluation of the General Theory of Relativity and the derived scientific concepts that rely on its framework. It underscores the importance of continuous questioning and reexamination in the pursuit of scientific truth, encouraging further research and discussion in the field of theoretical physics.