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Rethinking on Foundation of Special Theory of Relativity by Showing Irrational Use of Lorentz Transformation

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Abstract: ***Lorentz transformation provides ready equations for co-ordinate transformation of point, event of clock between two relatively moving inertial reference frames with uniform rectilinear relative velocity. But there are some primary limitations of these equations fixed due to method used to derive these equations. On of these limitations is, one cannot put a clock at the origin of any of two reference frames to get co-ordinate transformations. When one out clock at the origin of primed reference frame as what is done by Albert Einstein to derive time dilation value, it breaks the primary limitations for use of LT equations. If time dilation is a universal phenomenon, then similar results must be obtained with same equations when clock is put away from the origin O' of the primed inertial reference frame. but it is not the case. When we put clock on O', for any possible motion of S' frame there is only an increase in the distance between origin of S frame and the clock. But when we put clock away from the O', another possibility arises where origin O of the frame S can also move toward the clock. This results in derivation of two different results for relative time variation, one is time dilation, and another is time contractions. This ultimately leads to conflicts in the concept of relative time dilation for moving objects. This draws our attention to a tricky method used for derivation of time dilation by ignoring primary limitations for the direct use of LT equations.***

Keywords: Time dilation, time contraction, limitation of Lorentz transformation, speed of light postulate, wrong foundation of special relativity, special relativity

Article:

Let me show you, how the mathematical framework of the special theory of relativity is wrong.

I am talking about the wrong math used in the formulation of the special theory of relativity.

Error is there in the derivation of time dilation and length contraction consequences.

Following error is there.

"Lorentz transformation can work only with certain limitations." These limitations developed from a method used to derive LT equations. There is inter-relation between variables used in Equations. These interrelations don't allow an isolate change in one variable without affecting another related variable. If assume a situation where limitations of LT crossed, then direct use of LT equation in that situation is not justified. If we do so, it will be reflected as a retrograde mathematical conflict.

[Reference: paper id SR24317023642, with title "Showing limitations of the Lorentz transformations with its attributes" published in this same journal.]

In the derivation of both, Time dilation and length contraction, these limitations are not obeyed.

This is the only reason, that leads to formulation of the theory called special relativity which offers consequences beyond a classical physics.

Let proceed further to witness errors in the foundation of special relativity.

Let me describe two situations first, that will be used for reference in later part of this article.

situations:

Situation 1: when a clock moves away from the observer in other frame, gradual increase in the distance between the clock and the observer.

Situation 2: When clock moves toward the observer of other frame, gradual decrease is there in the distance between the clock and the observer.

Here I will first show you the derivation of time dilation as derived by albert Einstein in one of his books.

Now let's see what's given in A book, "Relativity, The special and The General theory by Albert einstein, 1916"

"Let us now consider a seconds-clock which is permanently situated at the origin $(x' = 0)$ of K' *and $t' = 0$ and $t' = 1$ are two successive ticks of this clock. The first and fourth equations of the Lorentz transformation give for these two ticks:*

$$t = 0$$

And

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

As judged from K, *the clock is moving with the velocity* v*; as judged from this reference-body, the time which elapses between two strokes of the clock is not one second, but $\frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$ seconds, i. e. a somewhat larger time. As a consequence of its motion the clock goes more slowly than when at rest. Here also the velocity* c *plays the part of an unattainable limiting velocity. "*

This was the description and calculation of time dilation given in that book.

Let me explain what it actually means.

So, as per the descriptions above,

$$\Delta t = t_1 - t_0$$

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

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

$$\Delta t = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} \; where \; v < c.$$

Now let's understand this with figure,

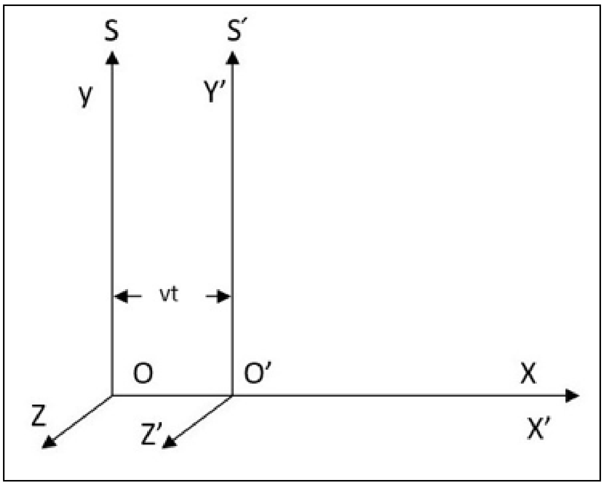

Figure 1

This is a standard figure used to derive Lorentz transformation when event or point P or a clock is placed on the positive X axis side of the inertial reference frame S.

Here it is assumed that clock is placed permanently at origin O' of primed reference frame S'. Here $x' = 0$ permanently. Means $x' = 0$ is always true here. Position of clock is fixed on the origin $(0, y', z', t')$ of the primed or moving reference frame S'.

Let me clarify other parameters in the figure. Here there are two inertial reference frames primed S' and non-primed S. S' is moving along the X axis of the reference frame S with uniform rectilinear velocity v. means X axis of both frames always co-inside with each other. During these movement there is no motion on the Y or Z axis. So, $y = y'$ and $z = z'$ is true at any stage of movement. There is change in the x co-coordinate only. We need to find time co-ordinate value in relation to origin of S frame for time co-ordinate of clock placed on the origin of the primed reference frame S'. Time co-ordinate in S frame for the clock is t, and in S' frame is t'.

Now at time t'=0.

Both frames overlap each other with overlapping of origin of both frames.

It this situation,
$t' = 0$ and $vt' = 0$.

If we talk about the x' in Lorentz transformation equation, then it is always 0 here, because we have put clock on the origin of primed reference frame.

Now if we apply Lorentz transformation equation; then,

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

$$t = \frac{0 + \frac{(0)\,v}{c^2}}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$t = 0$$

This is the value of t we get for $t' = 0$,

Now let me calculate for $t' = 1$.

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

$$t = \frac{1 + \frac{(0)\,v}{c^2}}{\sqrt{1-\frac{v^2}{c^2}}}$$

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

So, this is the value of t for $t' = 1$.
Time dilation,

$$\Delta t = t_1 - t$$

$$\Delta t = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} - 0$$

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

This was the explanation of the calculation given in the book by Albert Einstein which is not justifiable.

Actually, these calculations are not acceptable when we consider the limitations of use of Lorentz transformation, due to following reasons.

When we place a clock on the O' position, then $x' = 0$ becomes always true.

Let me show you the consequences for $x' = 0$.
Putting $x' = 0$ value in Lorentz transformations.

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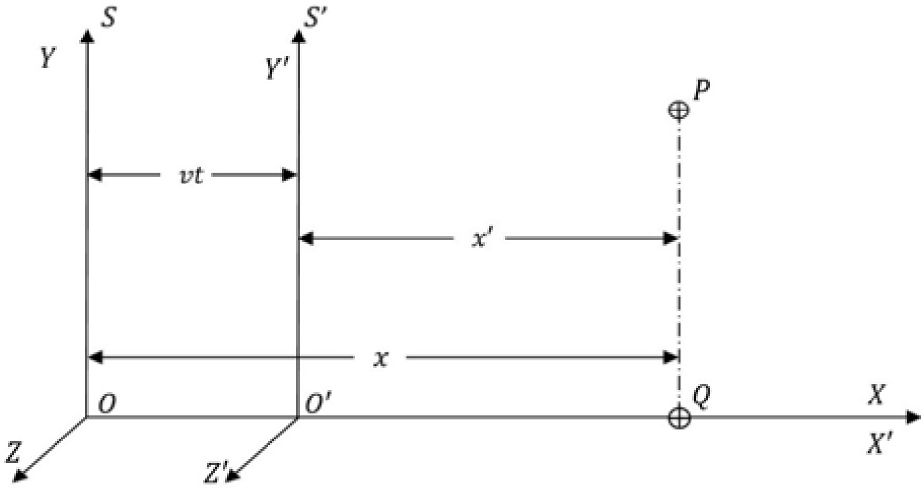

Figure 2

Description of the figure.

S and S' are two inertial reference frames. P is the point at which clock is placed and it is fixed in relation to primed reference frame S'. Q is the point on the X' axis with same X' co-ordinate as that of P. relative motion of the reference frames is along the X axis only, so there will not be change in the co-ordinates y and z of P or Q. Only co-ordinate that will show a change will be x. The change in x co-ordinate for P and Q will be same here. All calculations shown here is for Q only. We can apply results to x co-ordinate of P because there will be same changes in x co-ordinates of P and Q while this type of relative motion. We assume $OQ = x = ct$ and $O'Q = x' = ct'$ here, for the derivation of Lorentz transformation equations.

For light sphere relation,

$$x^2 + y^2 + z^2 = c^2 t_p{}^2 \; and \; x'^2 + y'^2 + z'^2 = c^2 t'_p{}^2$$

That will lead to

$$\Upsilon(x^2 + y^2 + z^2) = x'^2 + y'^2 + z'^2 \; and \; \Upsilon(c^2 t_p{}^2) = c^2 t'_p{}^2$$

For Q, $y = y' = 0$ and $z = z' = 0$,

$$x^2 + 0 + 0 = c^2 t_p{}^2$$

$$x = ct \; \dots\dots\dots\dots\dots.(a)$$

and

$$x'^2 + 0 + 0 = c^2 t'_p{}^2$$

$$x' = ct' \; \dots\dots\dots\dots\dots\dots\dots \; (b)$$

So, here we can use $x = ct$ and $x' = ct'$ for Q. this t is different from t_p used for light sphere equation. This t is valid for point Q on the X axis only.

Figure 2 is the figure which can be used to derive Lorentz transformation equations.

Here relativistic relations between x' and x is as follows.

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

And

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

By putting clock on the O', we are taking x' permanently equal to 0.

So, $x' = 0$,

$$0 = \Upsilon(x - vt)$$

$$0 = x - vt$$

$$x = vt$$

This is evident in a figure when we put clock on the O'

When we derive Lorentz transformation equations normally,

We consider following thing granted in calculations,
$x = ct$,

Here, this further lead to, $x = ct = vt$
So, $v = c$.

Which is not allowed by value of Υ itself. Υ becomes indefinite for $v = c$.

So, application of Lorentz transformation by putting clock on O' position is incorrect.

When we put the clock anywhere other than O',

We will get the following answer,

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

Here $v < c$.
And,

$$\Delta t = \frac{t_2' - x'_2 v/c^2}{\sqrt{1 - \frac{v^2}{c^2}}} - \frac{t_1' - x'_1 v/c^2}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$\Delta t = \frac{t_2' - x'_2 v/c^2 - t_1' + x'_1 v/c^2}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$\Delta t = \frac{t_2' - t_1' - \left(x'_2 v/c^2 - x'_1 v/c^2\right)}{\sqrt{1 - \frac{v^2}{c^2}}}$$

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$$\Delta t = \frac{t_2' - t_1' - \left(\frac{ct_2'v}{c^2} - \frac{ct_1'v}{c^2}\right)}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$\Delta t = \frac{t_2' - t_1' - \frac{v}{c}(t_2' - t_1')}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$\Delta t = \frac{(t_2' - t_1')\left(1 - \frac{v}{c}\right)}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$\Delta t = \Delta t' \frac{1 - \frac{v}{c}}{\sqrt{1 - \frac{v^2}{c^2}}}$$

For
$t' = 0$ and $t' = 1$ time dilation will be,

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

This will be true for reference frame moving toward P.

When we calculate for motion of moving reference frame away from the P,

It will show time contraction as below,

$$\Delta t = \frac{1 + v/c}{\sqrt{1 - \frac{v^2}{c^2}}}$$

So, exclusive derivation of time dilation only can be achieved by placing a clock on O' only which is not allowed if you want to use Lorentz transformation equations.

So, irrational use of Lorentz transformation equations leads to the concept of time dilation which is not the case when we follow the restriction of Lorentz transformation.

This refutes special relativity when compared for situation 1 and situation 2 on the ground of symmetry.

If we would like to check it on the other way.
Putting the value of x' in the equation no (2) from the equation no (1)

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

$$x = \Upsilon(\Upsilon(x - vt) + vt')$$

$$x = \Upsilon^2 (x - vt) + \Upsilon vt'$$

$$x = \Upsilon^2 x - \Upsilon^2 vt + \Upsilon vt'$$

$$\Upsilon vt' = x - \Upsilon^2 x + \Upsilon^2 vt$$

$$t' = \frac{x - \Upsilon^2 x + \Upsilon^2 vt}{\Upsilon v}$$

$$t' = \frac{x - \Upsilon^2 (x - vt)}{\Upsilon v}$$

Now putting the value
$x = vt$ in the above equation.

$$t' = \frac{vt - \Upsilon^2 (vt - vt)}{\Upsilon v}$$

$$t' = \frac{vt - 0}{\Upsilon v}$$

$$t' = \frac{t}{\Upsilon}$$

$$\Upsilon = \frac{t}{t'}$$

This equation doesn't allow the value of t' to be taken as 0.

It will always be wrong if you will take $t' = 0$.

Here also, $x = ct = vt$

Means $v = c$,

It also leads to the indefinite value of ϒ.

This means that, showing a time dilation calculations by putting clock at O' and applying Lorentz transformation equation is not valid.

When we put clock at any position other than O', then it will show both, time dilation and time contraction depending on the direction (situation 1 and situation 2 as described above) of the moving reference frame.

When we try to evaluate those relative time variations on the plot of symmetry for one reference frame, we reach to the conclusion that only possible value of ϒ can be 1, and only possible velocity v can be 0.

Means Lorentz transformation system doesn't yield anything like time dilation or time contraction by the application of speed of light postulate.

This draws attention to the unjustified foundation of the special theory of relativity.

Conclusion

Formation of the special theory of relativity with concept of time dilation and length contraction can only be possible by irrational and unjustified use of Lorentz transformation only. When valid restrictions for Lorentz transformations are applied, there cannot be a derivation of time dilation and length contraction possible in different situations. These conclude that it is a misunderstanding that leads to consequences shown in special relativity due to lack of awareness about the attributes and limitations of the use of Lorentz transformations.

References

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