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Showing Limitations of the Lorentz Transformations with its Attributes

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Abstract: ***Widely misused calculator is a Lorentz transformation. It is a calculator that calculates or transforms co-ordinates of the point between two relatively moving inertial reference frames with uniform rectilinear velocity in relation to each other. This calculator shows its works at the end of the event. Means when light reach from event point to the origin of the each moving reference frame. So, in a time t, when light from the event point reach to the origin of each reference frame, a moving reference frame moves a distance vt during that same interval which is shown as "t" in "vt". This is the basic understanding of the situation used in the Lorentz transformation. This confirms the restrictions shown in the article. The Lorentz transformation is applicable only with these restrictions.***

Keywords: Restriction of the Lorentz transformation, attributes of Lorentz transformation. Limitations of the Lorentz transformation

1. Introduction

Lorentz transformation is a widely misused tool to derive mysterious outcomes by crossing its limitations. Here with I am going to set those limitations because it is evident from the concept of the mechanism of the tool.

2. Article

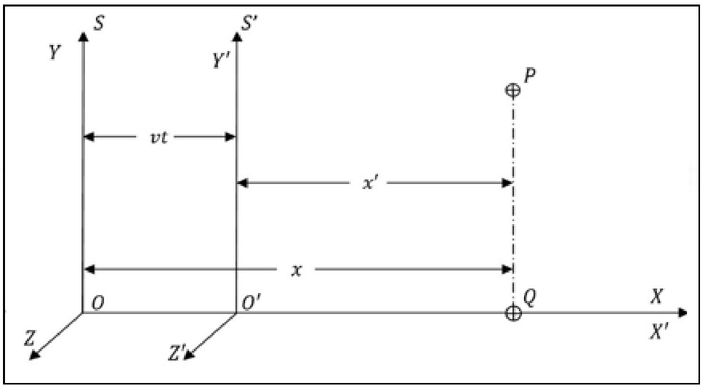

Figure 1

Cartesian planes are attached to S and S′ inertial reference frames.

S′ inertial reference frame is moving with uniform rectilinear velocity "v" along with positive X axis.

Point P is chosen randomly on the side of positive X axis in a stationary reference frame S, Co-ordinates of the P in the S frame is (x, y, z, t) and co-ordinates of the point P in the S′ frame is (x', y', z', t')

Q is a point on the positive X axis with co-ordinates (x, 0, 0, t)

Here, P is on the S, stationary and non-primed frame.

Here it has been said that S' moves along with X axis only, means y and z co-ordinates are not changed during relative motion.

So, from the figure it is evident here that, change is there in x and t co-ordinates only.

These two co-ordinate changes in same manner in P and Q.

So, if we just calculate these two-co-ordinate transformation for Q then it will be applicable to the P, and it will be well and good.

So, we will do that only, and won't mess with light-sphere relations.

Here there is an Event at Q. light arises from Q and reaches to origin of both frames S and S'.

That reaches to them at same time according to postulate two of the special relativity, an observer specific constancy of light.

S' is moving, it is moving with the constant uniform rectilinear velocity v along the X axis of the S frame.

So, in a time t, light will travel a distance $x = ct$ and will reach to origin of S, mean while in a reference frame S' light will travel a distance x' in a time t' and will reach to origin of the reference frame S'. During this period, moving

reference frame S' will travel a distance vt along with the X axis of the S frame resulting in the following relations.
$x = ct$ and $x' = ct'$

Visible relations are,

$$x = x' + vt'$$

And

$$x' = x - vt$$

Relativistic relations will be,

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

And

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

this will result in a Lorentz transformation equations as follows.

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

$$y' = y$$

$$z' = z$$

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

And Inverse Lorentz transformation equations as follows.

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

$$y = y'$$

$$z = z'$$

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

So, in Lorentz transformations,

Followings are limitations,
$x \neq 0$, value of the x must be more than zero, because when we assume event on the Y axis, it will take a no time for a light to reach Y axis from the event point. In that "no time" S′ won't be able to move, and there will not be a generation of relations required to derive equations of transformations, and Lorentz transformation won't work at all.

Now, for that nonzero x, distance ct can't be 0, so, it leads to $t \neq 0$, that will further lead to $vt \neq 0$.

Distance travelled by S′ frame must be more than 0, because for any $x \neq 0 \Leftrightarrow t \neq 0 \Leftrightarrow ct \neq 0 \Leftrightarrow vt \neq 0$. So, in a situation described above, for any $x \neq 0 \Leftrightarrow t \neq 0$, value of vt can't be 0.
$v < c$, (if we take $v = c$ or $v > c$, then value of the ϒ will become undefined)
$t > 0$. (If we take $t = 0$, then $x = ct = 0$, leads to no event. And no calculation.)

So, the Lorentz transformation is applicable only with following limitations,
1) $v < c$
2) $t > 0$
3) $x \neq 0 \Leftrightarrow t \neq 0 \Leftrightarrow ct \neq 0 \Leftrightarrow vt \neq 0$.
4) $x_1 \neq x_2 \Leftrightarrow t_1 \neq t_2 \Leftrightarrow ct_1 \neq ct_2 \Leftrightarrow vt_1 \neq vt_2$.

Violation of these **attributes** can seriously result in misleading consequences that will be inconsistence on the ground of symmetry and mathematics.

*Within this restriction, using postulates 2 of special relativity can lead to, refutation of special relativity itself.

3. Conclusions

Lorentz transformation equations are valid only when the limitations of the Lorentz transformation taken in considerations. Situations that cross these limitations don't fit in Lorentz transformation, there must be a fresh transformation calculation for such situations and direct use of Lorentz transformation equations in those situations is not justifiable.