Internal Paradox of Special Relativity Theory and its Resolution

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Abstract

Regarding to special relativity theory, there are some paradoxes. Almost these are derived from the theory. Then these should be resolved with the accurate deduction if possible. On the other hand, there may also be a paradox inside the theory. To solve it, more basic definition should be required.

1. Introduction

Lorentz transformation has been derived on the principle of light speed constancy, and some paradoxes were derived based on the result of the transformation. [1][2]
Also the principle of light speed constancy itself may have paradox. Resolution for it should require more basic principle.

2. Paradox of light speed constancy

When light flushes at point A in Fig.1, the light reaches at point ct_1 away after t_1.

c: light speed

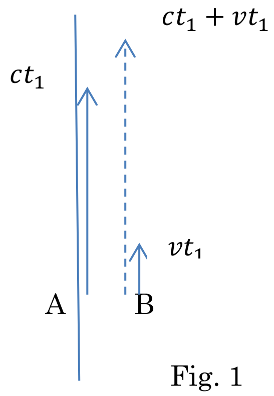

Fig. 1

Point B which moves from A with speed v reaches at point vt_1 away after t_1. On the principle of light speed constancy, for the frame of reference of point B, light should reach at $ct_1 + vt_1$ away from point A.

On above,

For A, light reaches at point ct_1 away from point A after t_1.

For B, light reaches at point $ct_1 + vt_1$ away from point A after t_1.

This means that light flushed at a point reaches at different points to same direction and for same time. This is a paradox about the principle of light speed constancy.
Here measurement of time and/or space for B is assumed to be same as it for A.

Actually light reaches at point ct_1 away from point A after t_1 for A and for B.
But the distance of light movement for A is different from it for B.
On this situation, if velocity of light should be same for A and for B, measurement of time and/or space for A should be different from these for B.
We should think how it is derived. There we should not adjust it mathematically to the result.

3. Resolution of the paradox

Following definition is introduced. [3]

'Time moves toward time direction also toward space direction with speed c.' (1)

This is equivalent to following

'Elapse time $\frac{x}{c}$ for time is to move space distance x.'

Same as in Fig.1, when light flushes at point A in Fig.2, the light reaches at point C(ct_1 away) after t_1.

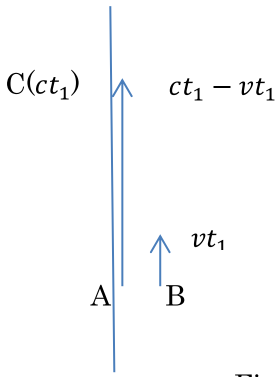

Fig. 2

Same as light, time reaches at point C and time $\frac{ct_1}{c} = t_1$ elapses.
Also point B reaches at point vt_1. Then for the frame of reference of point B, light moves $ct_1 - vt_1$ in space.

Same as this, time also moves $ct_1 - vt_1$ in space for B. This means time $\frac{(c-v)}{c}t_1$ elapsed.

It is,

For the frame of reference of point A, moved distance of light is ct_1.
For the frame of reference of point A, elapsed time is t_1.
For the frame of reference of point B, moved distance of light is $(c - v)t_1$.
For the frame of reference of point B, moved distance of time is $(c - v)t_1$.

For the frame of reference of point B, elapsed time is $\frac{(c-v)}{c}t_1$.

Here scaling for the frame of reference of oblique which is considered for Lorentz transformation is applied to these. [4]

For the frame of reference of point A, moved distance of light is ct_1.

For the frame of reference of point A, elapsed time is t_1.

For the frame of reference of point B, moved distance of light is $\frac{(c-v)}{\sqrt{1-\frac{v^2}{c^2}}}t_1$.

For the frame of reference of point B, moved distance of time is $\frac{(c-v)}{\sqrt{1-\frac{v^2}{c^2}}}t_1$.

For the frame of reference of point B, elapsed time is $\frac{(c-v)}{c\sqrt{1-\frac{v^2}{c^2}}}t_1$.

When time passes more up to $\frac{\sqrt{c+v}}{\sqrt{c-v}}t_1$, light and time reach point D and situation becomes as Fig.3.

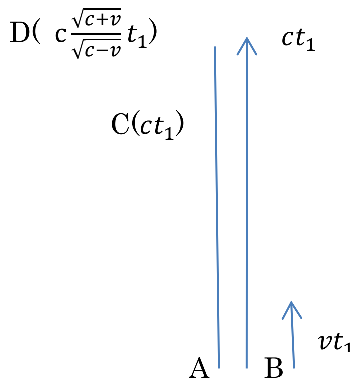

Fig. 3

Scaling for the frame of reference of oblique applied value is;

For the frame of reference of point A, moved distance of light is $\frac{c+v}{\sqrt{1-\frac{v^2}{c^2}}}t_1$.

For the frame of reference of point A, elapsed time is $\frac{c+v}{c\sqrt{1-\frac{v^2}{c^2}}}t_1$.

For the frame of reference of point B, moved distance of light is ct_1.

For the frame of reference of point B, moved distance of time is ct_1.

For the frame of reference of point B, elapsed time is t_1.

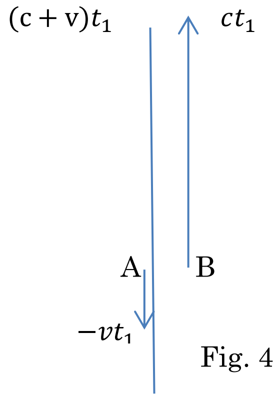

Fig. 4

This means similar situation as above can be realized from the view of frame of reference of B (Fig.4), this is;

Light flushes at point B reaches at point D(ct_1), also A reaches at $-vt_1$.

For the frame of reference of point A, moved distance of light is $(c+v)t_1$.

For the frame of reference of point A, elapsed time is $\frac{(c+v)}{c}t_1$.

For the frame of reference of point B, moved distance of light is ct_1.

For the frame of reference of point B, moved distance of time is ct_1.

For the frame of reference of point B, elapsed time is t_1.

Scaling for the frame of reference of oblique applied value is;

For the frame of reference of point A, moved distance of light is $\frac{(c+v)}{\sqrt{1-\frac{v^2}{c^2}}}t_1$.

For the frame of reference of point A, elapsed time is $\frac{(c+v)}{c\sqrt{1-\frac{v^2}{c^2}}}t_1$.

For the frame of reference of point B, moved distance of light is ct_1.

For the frame of reference of point B, moved distance of time is ct_1.

For the frame of reference of point B, elapsed time is t_1.

From all above,

If we accept the definition (1), light speed as ratio of moved distance and elapsed time is same for the frame of reference of point A and the frame of reference of point B in Fig.2, Fig.3 and Fig.4.

Also from Fig.2, Fig.3 and Fig.4, the situation is described similarly even if point A is fixed or point B is fixed.

4. Conclusion

The principle of light speed constancy has contradiction comparing daily experience. Then the special relativity theory on the principle of light speed constancy has contradiction in it. This contradiction is resolved using definition (1). The principle of light speed constancy is not definition. It is derived from the definition (1).

Reference

[1] Tsuneaki Takahashi, viXra:1604.0285,(http://vixra.org/abs/1604.0285)

[2] Tsuneaki Takahashi, viXra:1604.0328,(http://vixra.org/abs/1604.0328)

[3] Tsuneaki Takahashi, viXra:1611.0077,(http://vixra.org/abs/1611.0077)

[4] Tsuneaki Takahashi, viXra:1605.0039,(http://vixra.org/abs/1605.0039)