Special Relativity is Wrong (New Theory of Relativity)

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Abstract

This paper is to show how wrong derivations were used to conclude the formulas for time dilation, length contraction and relativistic mass .

When dealing with such a theory which is never proved experimentally, its mathematical origin and compliance with fundamentals of physics should be checked before starting to struggle in imagining what observers observe from different frames of reference or how behaviors change at this speed of that.

If the mathematical failure which will be discussed in this paper is added to the failure in proving this theory experimentally for decades, we conclude only one result which is that this theory is wrong.

Keywords

Special relativity, time dilation , length contraction , relativistic mass, Lorentz transformation

1.0 Mathematical Failures in deriving Time Dilation and Length Contraction

1.1 Definition of the Prime in Special Relativity Equations

The two Lorentz transformation equations of special relativity are:

$$ct` = \alpha\,(ct - vt) \qquad 1.1$$

$$ct = \alpha\,(ct` + vt`) \qquad 1.2$$

Referring to figure 1.1 using x = xt , x` = ct` and vt, we can define the prime in equations 1.1 and 1.2 as :

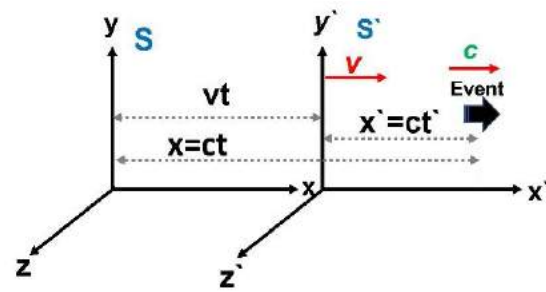

Figure 1.1

$$\gamma = \left(\frac{ct`}{ct}\right) = \left(\frac{t`}{t}\right) \qquad 1.3$$

$$ct` = ct\left(\frac{t`}{t}\right) = \gamma.ct \qquad 1.4$$

vt` is defined as

$$vt` = vt\,.\left(\frac{t`}{t}\right) = \gamma.\,vt$$

Substituting in equations 1.1 and 1.2 we get

$$ct\left(\frac{t`}{t}\right) = \alpha\,(\,ct - vt\,) \qquad 1.5$$

$$ct = \alpha\,\{ct\left(\frac{t`}{t}\right) + vt\left(\frac{t`}{t}\right)\} \qquad 1.6$$

Solving for α by multiplying equations 1.5 by 1.6 we get

$$c^2t^2\left(\frac{t`}{t}\right) = \alpha^2\{c^2t^2\left(\frac{t`}{t}\right) + cvt^2\left(\frac{t`}{t}\right) - cvt^2\left(\frac{t`}{t}\right) - v^2t^2\left(\frac{t`}{t}\right)\}$$

$$c^2 = \alpha^2\,(\,c^2 - v^2\,)$$

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

$$\alpha = 1 / \sqrt{1 - v^2/c^2} \quad 1.7$$

This derivation shows that the prime in ct` and vt` in equations 1.1 and 1.2 is equivalent to multiplication by γ.

1.2 Does (α) equal to (t`/t)

If α = (t`/t), then it should solve both equations 1.1 and 1.2.

Substituting α in equation 1.1 gives

$$ct` = (t`/t)\ (\ ct - vt\ )$$

$$ct` = ct` - vt`$$

$$c = c - v \quad 1.8$$

This shows that if α = (t`/t) in equation 1.1, then it leads to only one solution which is (v = 0) otherwise the equation is wrong and therefore, for any values other than (α = 1 and v =0), equation 1.1 is wrong and this corresponds to no motion of the moving frame of reference and no relativity.

Referring to figure 1.1 it is obvious that (ct – vt = ct`) and the factor α should be equal to 1.

If the same α is substituted in equation 1.2 we get

$$ct = \alpha\ (ct` + vt`)$$

$$ct = (t`/t)\ (\ ct` + vt`)$$

$$ct = (\ t`^2/t)\ (c + v)$$

$$ct = (t`/t\ )^2(\ ct + vt)$$

$$ct^2 = ct`^2 + vt`^2$$

$$(t`/t\ )^2 = c\ /\ (\ c + v)$$

$$(t`/t) = \alpha = 1\ /\ \sqrt{c + v/c} \quad 1.9$$

Equalizing equations 1.9 and 1.7 gives

$$\alpha^2 = c\ /\ (\ c + v) = c^2/(\ c^2 - v^2\ )$$

which leads again to

$$c = c - v$$

Also multiplying equation 1.2 by (ct) with substituting (t`/t) for α gives

$$c^2t^2 = (t`/t)\,(c^2tt` + vctt`)$$

$$c^2t^2 = c^2\,t`^2 + cvt`^2 \qquad 1.10$$

and equation 1.7 gives

$$c^2t^2 = c^2t`^2 - v^2t`^2 \qquad 1.11$$

equalizing equations 1.10 and 1.11 gives

$$c^2\,t`^2 + cvt`^2 = c^2t`^2 - v^2t`^2$$

which leads to

$$c = c - v \quad \text{or } c = -v$$

1.3 Different Solutions for α in one derivation

Since (ct` = ct -vt) is a correct equation, α = 1 is the only solution for this equation.

The solution of the second equation is

$$ct = \alpha\,(\,ct` + vt`)$$

$$ct = \alpha\,(\,\gamma ct + \gamma vt)$$

$$\alpha = c\,/\{\gamma(C + v)\} \qquad \text{but } \gamma = (c - v)/c$$

$$\alpha = c^2\,/(c\text{-}v)(c\text{+}v)$$

$$\alpha = c^2/(c^2 - v^2)$$

comparing the above two solutions for α with equation 1.7, we find that α has three different solutions in one derivation.

1.4 (α) in the first Galilean transformation equation

The first Galilean transformation equation is

$$x` = x - vt \qquad 1.12$$

we can express it in a linear from where x` is a function of x and time as:

$$x` = \alpha\,x + ßvt \qquad \text{(where } \alpha \text{ and ß are constants)} \qquad 1.13$$

when x` = 0, then x = vt, and if substituted in equation 1.13 with referring to figure 1.1 we get

$$0 = \alpha\,x + ßvt$$

$$\alpha x = -\,ßvt$$

$$\alpha vt = - ßvt$$

$$\alpha = - ß$$

$$x` = \alpha x + (-\alpha)vt$$

$$x` = \alpha (x - vt) \qquad 1.14$$

This derivation shows how α came to one side of the equation not to the other, but if consider the case when $vt = 0$ and $x = x`$ and rewrite equation 1.14 as

$$gx` = \alpha(x - vt)$$

Substituting $vt = 0$ and $x` = x$ we get

$$gx` = \alpha(x - vt)$$

$$gx` = \gamma x$$

$$g = \gamma$$

thus $$\gamma = - ß = g$$

and this shows that equation 1.12 should be fully multiplied by α as

$$\alpha\, x` = \alpha (x - vt)$$

which is equivalent to not multiplying it by any factor keeping it in the form of equation 1.12.

In other words, α for this equation should be equal to 1 because it is a correct equation and does need a correction factor.

1.5 The correct derivation of α and its relation with (t`/t)

Since we found that α in the first Lorentz transformation equation is 1, we can rewrite equations 1.1 and 1.2 as

$$ct` = ct -vt \qquad 1.15$$

$$ct = \alpha (ct` + vt`) \qquad 1.16$$

Where the first equation is correct and does not need a correction factor but second one became wrong after converting vt into vt` when multiplying it by γ and requires a correction factor α

γ is defined γ as

$$\gamma = (ct`/ct ) = ( t`/t) = (ct - vt)/(ct) = (c - v)/c$$

equations 1.15 becomes

$$ct` = ct - vt$$

$$\gamma ct = ct - vt \qquad 1.17$$

and equation 1.16 becomes

$$ct = \alpha(ct` + vt`)$$

$$ct = \alpha\,(\gamma ct + \gamma vt)$$

$$ct = \alpha\,\{\gamma ct + \gamma ct\,(vt/ct)\}$$

$$1 = \alpha.\gamma\,(1 + v/c)$$

$$\alpha = 1\,/(1 + v/c)\,\gamma$$

$$\alpha = 1\,/\,\{(c\text{-}v)(c + v)\}/c^2$$

$$\alpha = c^2\,/\,(c^2 - v^2)$$

$$\boldsymbol{\alpha = 1/(1 - v^2/c^2)} \qquad 1.18$$

to find the relation between α and (t`/t) we have

$$\alpha = 1\,/\,\{(t`/t)(c + v)/c\}$$

$$\alpha = (t/t`)\{c/\,(c + v)\}$$

$$(t`/t) = c\,/\,\alpha(c+v)$$

$$\boldsymbol{(t`/t) = 1\,/\,\alpha\,(1+v/c)} \qquad 1.19$$

1.6 Multiply vt by (γ) was an error and (α) is the correction factor

Substituting for γ in the second transformation equation, we get

$$ct = \alpha\,(ct` + vt`) \qquad 1.20$$

$$ct = \alpha\,(\gamma ct + \gamma\, vt) \qquad 1.21$$

$$ct = \alpha\,\{\,(\tfrac{c-v}{c})\,ct + (\tfrac{c-v}{c})\,vt\} \qquad 1.22$$

but $vt = ct\,(\frac{vt}{ct})$, then

$$ct = \alpha\{\,(\tfrac{c-v}{c})\,ct + (\tfrac{c-v}{c})\,ct\,(\tfrac{vt}{ct})\,\}$$

$$1 = \alpha\,(\frac{c-v}{c})(\,1 + \frac{v}{c}\,)$$

$$1 = \alpha\,(\frac{c-v}{c})(\frac{c+v}{c})$$

$$\alpha = \frac{c^2}{c^2-v^2} \qquad 1.23$$

If we omit γ in the second term of equation 1.20 we get

$$ct = \alpha\,(\,\gamma ct + vt)$$

$$ct = \alpha\,\{\,(\frac{c-v}{c})\,ct + vt.\}$$

$$ct = \alpha\,\{\,(1-\frac{v}{c})\,ct + ct\,(\frac{vt}{ct})\}$$

$$1 = \alpha\,\{\,1 - \frac{v}{c} + \frac{v}{c}\}$$

$$\alpha = 1$$

This shows that the only reason to include α in the second equation is the multiplication of the second term (vt) by γ to become (vt`) while the first equation is correct and does need a factor α.

Accordingly, Lorentz transformation equations should be written as

(1) $ct` = ct - vt$ 1.24

(2) $ct = ct` + vt$ 1.25

$$ct = \gamma`ct + \gamma ct \qquad 1.26$$

where $\gamma` = (\frac{c-v}{c}) = (1-\frac{v}{c})$ is the fraction of ct in the moving frame of reference

$\gamma = (1 - \gamma`) = (\frac{v}{c})$ is the fraction of ct in both frames

equation 1.26 becomes

$$ct = (\frac{c-v}{c})\,ct + \frac{v}{c}\,ct \qquad 1.27$$

Accordingly, we conclude that the two equations should be written as

$$ct` = (1)(ct - vt)$$

$$ct = \alpha\,(ct` + vt`)$$

where α is $\alpha = \frac{c^2}{c^2+v^2}$

2.0 Relativistic Mass

To find the relation between the equation $E = mc^2$ and relativistic mass, let's start with

$$\partial k = \partial W = F.\partial s$$

Where F is an external force and W is the work done in a distance s.

$$F = \frac{\partial p}{\partial t} = \frac{\partial (mv)}{\partial t}$$

$$F = m\frac{\partial v}{\partial t} + v\frac{\partial m}{\partial t} \qquad 1.28$$

$$\partial k = \partial s.\, m\frac{\partial v}{\partial t} + \partial s.\, v\frac{\partial m}{\partial t} \quad (\text{But } \frac{\partial s}{\partial t} = v)$$

$$\partial k = mv\partial v + v^2\partial m \qquad 1.29$$

But considering an external force, equation 1.28 is

$$F = ma + v\frac{\partial m}{\partial t}$$

This indicates that the second term in equation 1.28 is zero where this portion of the force is generated by the mass change not like the first term where the acceleration is generated by the force.

Accordingly, $F = v\frac{\partial m}{\partial t} = 0$ when F is an external force and $v^2\partial m = 0$ in this case which is applicable only for speeds below the speed of light.

Thus, for speeds below the speed of light, the change in kinetic energy is

$$\partial k = m_0 v\partial v \qquad 1.30$$

Also, if α is expressed as

$$\alpha = \frac{m}{m_0} = 1 + \frac{v^2}{c^2}$$

$$\frac{m}{m^0} = \frac{c^2+v^2}{c^2}$$

$$mc^2 = m_0c^2 + m_0v^2 \quad (\text{derive})$$

$$c^2\partial m = 2m_0v\partial v \qquad 1.31$$

Comparing equations 1.31 and 1.30 we get

$$c^2\partial m = 2\partial k \qquad 1.32$$

Substituting ($\partial k = ½\, mc^2$ - $½\, m_0c^2$) in equation 1.32 gives

$$c^2(m\text{-}m_0) = 2.\ (½\, mc^2 - ½\, m_0c^2)$$

$$c^2(m\text{-}m_0) = c^2\ (m\text{-}m_0)$$

Substituting ($\partial k = ½\, m_0v^2 - ½\, m_0{v_0}^2 = ½\, m_0v$) in equation 1.32 Considering that v_0 is equal to 0, we get

$$mc^2\text{-}m_0c^2 = 2.\ (½\, m_0v^2)$$

$$\mathbf{mc^2 - m_0c^2 = m_0v^2}$$

$$mc^2 = m_0(c^2+v^2)$$

$$m = m_0\ (1+\frac{v^2}{c^2})$$

If equation 1.32 is written as

$$c^2\partial m = \partial k + m_0.v.\partial v \qquad 1.33$$

$$\mathbf{c^2(m\text{-}m_0) = \Delta k + ½\, m_0v^2} \qquad 1.34$$

Then, when $\partial k = (½\, mc^2\text{-}\ ½\, m_0c^2)$ we get

$$c^2(m\text{-}m_0) = (½\, mc^2 - ½\, m_0c^2) + m_0v^2/2$$

$$½\, mc^2 - ½\, m_0c^2 = ½\, m_0v^2$$

$$\mathbf{mc^2 - m_0c^2 = m_0v^2}$$

when $\partial k = (½\, m_0v^2 - ½\, m_0{v_0}^2) = ½\, m_0v^2$ $(v_0 = 0)$

$$mc^2\text{-}m_0c^2 = ½\, m_0v^2 + ½\, m_0v^2$$

$$\mathbf{mc^2 - m_0c^2 = m_0v^2} \qquad 1.35$$

Also, equation 1.35 can be written as

$$½\, mc^2 - ½\, m_0c^2 = ½\, m_0v^2 \qquad 1.36$$

Equation 1.36 means that the change in kinetic energy at the speed of light is caused the change in mass which itself is caused by an initial potential energy not by an external force.

Example:

If a particle is travelling at the speed of light from point A to point B where its mass and kinetic energy at point A are (m_0, k_0) and (m, k) at point B and it has an initial potential energy E_P, then, with no external source of energy or force, the energy at point A equals to the energy at point B

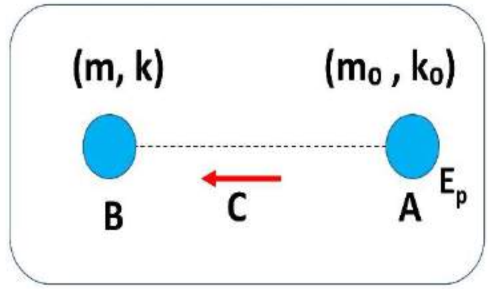

Figure 1.2

$$\tfrac{1}{2}\, mc^2 = \tfrac{1}{2}\, m_0c^2 + Ep.$$

$$\tfrac{1}{2}\, mc^2 - \tfrac{1}{2}\, m_0c^2 = \Delta k = Ep$$

If we define Ep. in a translational kinetic energy scale to be equivalent to the energy required to accelerate the particle from rest to speed v (maximum value of v = c) with constant mass m_0, then

$$Ep = \tfrac{1}{2}\, m_0v^2$$

$$\tfrac{1}{2}\, mc^2 - \tfrac{1}{2}\, m_0c^2 = \tfrac{1}{2}\, m_0v^2$$

$$\mathbf{mc^2 - m_0c^2 = m_0v^2}$$

$$m = m_0\left(1+\frac{v^2}{c^2}\right)$$

Since the maximum value of v is C, then substituting c for v gives ($m = 2m_0$)

$$\Delta k = \tfrac{1}{2}\, m_0c^2$$

$$\frac{\Delta m}{m_0} = \frac{v^2}{c^2}$$

If $Ep = \tfrac{1}{2}\, m_0c^2$ at point A, then the total energy of the particle is

$$k = k_0 + Ep = \tfrac{1}{2}\, m_0c^2 + \tfrac{1}{2}\, m_0c^2 = \mathbf{m_0c^2}$$

At point B with $m = 2m_0$ where all the energy Ep is converted to translational kinetic energy, the total energy of the particle is

$$E = \tfrac{1}{2}\,(2m_0)\, c^2 = \mathbf{m_0c^2}$$

Thus, equations 1.28 and 1.29 should be understood as working in two domains, the first at speeds below the speed of light where translational kinetic energy increases with velocity under the effect of an external force and the second where translational kinetic energy increases with mass at the speed of light without the need of an external force but by an initial potential energy.

The theory of relativity combined the energy/mass behavior at the speed of light to the energy/velocity behavior at speeds below the speed of light to force both to act at speeds below the speed of light which is equivalent to multiplying vt by γ in the second equation of special relativity.

Conclusions

a) A wrong mathematical derivation was used to find the factor α of time dilation and length contraction and accordingly this part of special relativity is completely wrong.
b) Waves' particles do have mass
c) Mass varies only at the speed of light while at speeds below the speed of light, only velocity causes the kinetic energy to vary.
d) The total energy of a wave particle travelling at the speed of light is always constant and equals to $E = m_0c^2$.
e) The velocity and kinetic energy vary by an external force at speeds below the speed of light while the change of kinetic energy at the speed of light is caused by an initial potential energy which causes mass and translational kinetic energy to increase when it is converted to translational kinetic energy.
The force at the speed of light is generated by the change in mass not by any external factor.
f) Some of the theories of physics like free space, light medium , absolute and relative frames of reference, space time etc. should be reviewed and revised after revealing the mistakes happened in finding these theories.

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