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Feynman's Relativistic Mistake

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Introduction

The existing maths as used in Special Relativity (SR) is fatally flawed. The only person that appears to have tried to correct this flaw is Richard Feynman and he made a mistake.

The consequences are that Special Relativity as used by physicists is not clearly mathematically defined; it is ambiguous. This means anyone engaging in the ill-defined maths of existing Relativity theory can derive different answers. Different experimentalists can perform their experiments collect their data and then perform mathematics that is not consistent with how other experimentalists have performed their work. i.e. existing physics community works from an ambiguous theoretical framework that can allow different answers that are contradictory to be believed as part of that theory, provided certain mathematical manipulations are engaged in.

The existing framework believes in length contraction, time dilation and so forth; but does not realise that there are different versions of these mathematical entities. This means an experiment's data can be manipulated by one of these mathematical entities without the realisation that there exist different versions of these mathematical entities. i.e. a length contraction piece of mathematics could be performed on data, and that be the wrong version of the length contraction to what another experimentalist has performed. Hence data is being amassed that might be contradictory, but it is manipulated so that it appears consistent within a theoretical framework which allows ambiguities like this. In other words – the experimental data that has been supposed collected in support of Special Relativity is worthless, because the existing maths of that theory is fatally flawed and allows conflicting data to be accepted.

The Observation frames

My method is --- equate distance travelled between mirrors in O frame with distance travelled between mirrors in O' frame then they become equal.

O frame–
Person in O frame observes of own clock

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B---------
     |
     |       L = c (1/2 delta t)
A____|____
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Fig.1

O' frame observing O frame

Triangle hyp = c (1/2 delta t')
Horizontal = v (1/2 delta t')
Vertical = L'

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                        B
                       /|
  H' = hyp            / |
                     /  |  vertical
                    /___|
                  A      A'
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Fig 2

In O frame light observes travelling A to B a distance c (1/2 delta t)
In O' frame light observed travelling A to B a distance of c (1/2 delta t')

I equate these distances and get t = t'

Whereas Standard maths of SR has light covering a direction and distance that one observer sees (namely L) and light covering a direction and distance that no one sees light cover (namely L').

Light is moving between two mirrors A and B, each observer agrees that, but Standard maths of SR wants the distance to be the vertical of the triangle (L') -- a different distance to which no one is observing.

Light moves A to B for both O and O' frame observers.

But the faulty maths of SR equates distance (L) from A to B with distance (L') from A' to B.

This is a mistake and it should be distance A to B of O observer equals distance A to B of O' observer.

As pointed out to me, this amounts to lateral length contraction, when I say H' = L.

There is No time dilation in scenario I illustrate of H' = L. (Although on further analysis beyond this article, it maybe reinterpreted back again?)

There are however two types of time dilation; the SR type and the General relativity (GR). In this article I am only dealing with the first type SR.

One of the objections to doing away with SR time dilation, is what of the time dilation that is thought to be observed?

There is supposed to be evidence for time dilation from experiments; however they are probably not sufficient, being interpreted incorrectly etc. Essen the atomic clock expert has pointed out a supposed experiment to measure time dilation by atomic clock measurements – the clocks were not able to measure to required accuracy strongly implying the experiment was fudged.

The problem with the atomic clock experiments (taking a clock around the world by airplane) was probably that there were two contributions to time dilation involved: namely one from SR and one from GR, the latter being the larger with the SR one probably too small to really measure. But unfortunately Essen's criticism seems to be ignored by the mainstream.

Essen:

"One aspect of this subject [i.e. Einstein's theory}] which you have not dealt with is the accuracy and reliability of the experiments claimed to support the theory. The effects are on the border line of what can be measured. The authors [i.e. those testing Einstein's theory] tend to get the result required by the manipulation and selection of results. This was so with Erdington's eclipse experiment, and also in the more resent results of Hafele and Keating with atomic clocks. This result was published in Nature, so I submitted a criticism to them. In spite of the fact that I had more experience with atomic clocks than anyone else, my criticism was rejected. It was later published in the Creation Research Quarterly, vol. 14, 1977, p. 46 ff.” [1]

The interpretation of standard SR maths

The O' observer sees a right triangle with light travelling along its hypotenuse. The base of the triangle is v (1/2 delta t'), its height is L’ (which it equates to L and so often just refers to as L in relativity texts) and the hypotenuse is c (1/2 delta t'), which gets written by Pythagoras theorem as:

(c (1/2 delta t')^2 = (v (1/2 delta t')^2 + L^2.

So

(c^2 – v^2)(1/2 delta t')^2 = L^2,

or delta t' = 2L/sqrt(c^2 – v^2)

The O observer sees light travelling straight up the distance L = c (1/2 delta t), which gets substituted into 2L/sqrt(c^2 – v^2) giving:

delta t' = 2 c (1/2 delta t)/sqrt(c^2 – v^2)

becoming:

delta t' =   c (delta t)/sqrt(c^2 – v^2)

dividing top and bottom of right hand side by c, becomes:

delta t' =   (delta t)/sqrt(1 – v^2/c^2)

Which is SR time dilation equation using standard maths.

In the past I have accepted such a derivation. But now I object to the assumption that L = L’, which is often hidden by not even mentioning L’ in some texts.

I object because – person in O frame observes distance c (1/2 delta t) and this does not equal the L’ seen from the O’ frame, instead it equals the hypotenuse of the O' frame. I say the standard maths of SR makes a mistake by having L = L’.

A derivation starting from universal time

My derivation starts from saying L = H′ and then I get t = t′.

This t= t′ is saying that both frames observe the same time intervals; this has been called "universal time."

It is one of the assumptions attributed to Newtonian physics, that Newtonian physics is based upon assuming universal time.

And it was the derivation of time dilation (which I claim by faulty maths) which made SR look different to Newtonian physics, in that it was not following the idea of universal time.

We could start from the idea of universal time in analysing the observations of the O and O′ frame and see where that leads us.

i.e. start from assuming t = t′

from fig 1 we have:

L = c (1/2 delta t)

From fig 2 we have:

Triangle hyp = c (1/2 delta t′)

Horizontal = v (1/2 delta t′)

Vertical = L′

Letting t = t′ these equations are then:

L = c (1/2 delta t)

hyp = c (1/2 delta t)

Horizontal = v (1/2 delta t)

Vertical = L′

For L = c (1/2 delta t), making delta t the subject:

delta t = 2L/c ....(1)

For L′ we have:

$$L'^2 = c^2 (1/2\, \Delta t)^2 - v^2 (1/2\, \Delta t)^2$$

Making delta t the subject:

$$(1/2\, \Delta t)^2 = L'^2 / (c^2 - v^2)$$

$$\Delta t = 2L' / \sqrt{c^2 - v^2} \quad \text{.... (2)}$$

Equating (1) and (2)

$$L/c = L' / \sqrt{c^2 - v^2}$$

Re-arrange:

$$L' = L \sqrt{1 - v^2/c^2}$$

Note that this means that the hypotenuse in the primed frame
is $H'^2 = L'^2 + (v (1/2\, \Delta t))^2$,

or $H'^2 = L^2 (1 - v^2/c^2) + (v (1/2\, \Delta t))^2$
$H' = L^2 - v^2 L^2/c^2 + (v (1/2\, \Delta t))^2 = L^2 - v^2 (1/2\, \Delta t)^2 + v^2 (1/2\, \Delta t)^2$ giving $H' = L$

i.e. starting from universal time of $t = t'$ we get $H' = L$. A symmetry in that $H' = L$ also leads us to $t = t'$.

Which is my thesis for the correct use of the Pythagorean Theorem in the representation of the problem. Note that if you assume $t = t'$, you get $H' = L$, and vice versa. If you assume $L = L'$, you get the faulty maths commonly used in SR.

The constancy of c from SR assumption is used in both approaches. So that eliminates differences there. The difference is that my claim $h = h'$ leading to L not equal to L', leading to $t = t'$. The SR assumption is $L = L'$, leading to t not equal to t'.

My approach is equivalent to L (lateral) contraction.

So, the question becomes why does standard SR texts not consider the possibility of lateral contraction, which we shall now investigate--

Initially one might think there was an extra assumption added to standard SR, which has not been explicitly stated. But actually it comes from an erroneous proof from the existing two postulates that there is no lateral change. This supposed proof was found by me to be in error. Hence standard SR should really be concerned with the issue of Lateral contraction not just longitudinal contraction.

Most relativity texts don’t deal with the issue of lateral contraction; however there is one text that seems authoritative upon this issue from Feynman's Lectures on Physics, Vol. 1, Chapter 15.

Feynman deals with the issue which most relativity texts don’t seem to go into detail about, and which they just state it without deriving it, or stating it as an assumption.

Feynman states it:

"How do we know the perpendicular lengths do not change? The men can agree to make marks on each other's y-meter stick as they pass each other. By symmetry, the two marks must come to the same y- and y'-coordinates, since otherwise, when they get together to compare results, one mark will be above or below the other, and so we could tell who was really moving."

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y
/\
 |                       O frame
 |____\    x
      /
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The axis y is the lateral direction for O frame; and O’ frame has y’.

What Feynman is seemingly saying is that if you believe L shrinks, then you believe in absolute velocity and reject the principle of relativity. Since no measurement we make can detect this absolute reference frame, L' must equal L. So it's really not an extra assumption, but rather a consequence of the first postulate of SR. [2]

Suppose we put high-power lasers on the end of each rod (length L in their own frame) and direct them to mark the other's rod as they pass each other. Is it contradictory to find that each rod has a mark on it at distance less than L? [2]

And so of course poor Feynman is wrong. He neglects that the light clocks are synchronised so that when both in the rest frame they measure the same time intervals.

The O frame has light clock

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Similarly the O' frame has such a light clock, if person in O' frame compares measure of O frame's clock with his own then there is different (magnitudes of) distances involved.

O' frame observation of O clock is:

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         / |
 H'     /  |
       /   |
      /    |
     -------
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with vertical of square root((c^2 - v^2)) (1/2 delta t')

the vertical distance of O' frame light clock is c (1/2 delta t')

not the same (magnitudes of) distances.

Probably he was too fixated with comparing O frame's clock measurement with O' frame's measurement of O frame's clock, and forgetting O' frame measurement of O' frame clock.

Feynman violates relativity, instead of upholding it.

I think in his biography, he admits to not having much respect for maths; so he just bodges the maths.

Looking again at what Feynman says in more detail

Feynman states it: "How do we know the perpendicular lengths do not change? The men can agree to make marks on each other's y-meter stick as they pass each other. By symmetry, the two marks must come to the same y- and y'-coordinates, since other- wise, when they get together to compare results, one mark will be above or below the other, and so we could tell who was really moving."

It’s instructive to know what Feynman omits to say.

Given two perpendicular distance-rods one in the O frame the other in O' frame of the same length.

Now if the perpendicular distance-rods change their length during motion, such that by relativity each observer from their rest frame observes the other's perpendicular length changed, and they mark off each other's rod, they by symmetry (of relativity) mark each other's as the same length along the rod, and when these rods come back to rest in the same rest frame their lengths restore to the rest frame lengths and both rods are then observed as marked for the same distances.

So, during motion their perpendicular distances might be different to when at rest.

He does not mention that possibility.

So, when he considers about perpendicular lengths do not change; he does not include what is really relevant namely the rods might have symmetrically changed when in relative motion to how they were when at rest.

Each could appear shorter to the other, so symmetry is maintained. That satisfies his concern about an absolute Reference frame (i.e., the principle of relativity still holds).

So, Feynman is a sort of authoritative figure saying no lateral contraction, and his reason for that is at fault. It is possible to do the maths my way, and since he did not consider that possibility, he is thus in error. There can be lateral contraction, which means there can be universal time. Not only that – by this derivation – the rods held in perpendicular directions to constant velocity have symmetrically changed when in relative motion to how they were when at rest. So, a laser light emitted from one observer to the other’s rod marking off a unit length, will find that unit length different to when the rod is brought to rest. And by symmetry of relativity, both observers will observe this.

Do the maths as I have explained, and it is consistent with the postulates.

It seems that Feynman when he makes this mistake is trying to compensate for an earlier mistake in relativity theory of this possibility not being considered by Einstein. So there is a knock-on effect of one mistake leading to more mistakes being added. This leads us now to-

There is the possibility that what Fitzgerald was referring to as contraction was lateral contraction, and what Lorentz was referring to was longitudinal contraction. So that the mainstream have misidentified both contractions as the same thing when they call it "Lorentz-Fitzgerald contraction"; when really they are two different contractions.

I have been thinking in terms of contraction, but Ronald Pearson thinks in terms of expansion for the lateral direction; it is still a change in length that needs to be investigated by experiment. *

Ronald Pearson deals with this possibility of lateral expansion, stating that Dingle and others have noticed it, and proposes an experiment:

"According to Dingle (1972), Fitzgerald provided an alternative to the Lorentz explanation, which had the advantage of being theoretically based. Fitzgerald realised that a pair of electric charges in motion side by side relative to the EM frame would create interacting magnetic fields causing a tendency to repel one another. This would reduce the electric force of attraction that binds electrons of atoms to their nuclei. He then showed atoms could be stretched sideways in the proportion $0.5(v/c)^2$ due to magnetic forces: so providing an alternative to the Lorentz explanation for the null results of the Michelson Morley experiment."

"This experiment had two arms of equal length mounted perpendicular to each other. The effect of absolute speed would cause light to take longer to travel forward and back along the arm pointing forward than for light going sideways. But if the latter was stretched by magnetic force in the proportion $0.5(v/c)^2$ the time difference would be exactly cancelled." [3]

For more details see his article.

Conclusion

Because of this incomplete derivation of existing Special Relativity, the existing paradigm by which physicists work by is fatally flawed and their experiments worthless. The total lack of basing modern physics on a firmly defined mathematical background means that physicists are allowed to manipulate data in ways that are mathematically inconsistent, and allowing inconsistent results makes all their work useless and ambiguous.

References

[1] http://www.wbabin.net/science/rickeressen.pdf
[2] Based upon what I was told through email correspondence.
[3] A NEW TEST FOR RELATIVITY IN EARTH ORBIT, R.D. Pearson, http://www.wbabin.net/science/pearson.pdf

* added update 2nd January 2008