Timeline interchange due to motion

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Abstract

According to the special relativity, time dilates for an observed body which travels through space relative to an observer. This paper has extended the concept of time dilation that leads us to an unanticipated conclusion. *The current research work concludes that when one extends the time dilation then there is a timeline interchange for the object that is in motion. It simply means that an observed body because of its motion travels into the past of the observer's timeline because the rate of flow of time for the observed body has been dilated relative to the observer's rate of flow of time. It should be noted that the observed body has not traveled to its past (as the rate of flow of time is only dilated not reversed). This means that the past interpreted by the observer would not be the past of that observed body but the present of the observed body. It can be seen here that the Einstein's now concept (which is a theoretical prediction of special relativity) which says that an observed body's now(present) may not be same for an observer's now(present), it may be past or future depending upon the direction of motion of the observed body relative to the observer's frame is a direct consequence of the timeline interchange because of the time dilation (this will also be true when the frame of reference interchanged i.e. the observer is moving relative to the observed body in that case the observer will travel into observed past provided that there Is no common reality of who is moving in the cases of motion with constant velocity). This concludes that the timeline interchange can justify the reason for Einstein's now concept and help us to progress in understanding the true nature of time.*

Keywords: Relative time; Time dilation; Einstein's now concept; Timeline interchange; Special Relativity.

This paper only deals with constant velocity. The cases of acceleration or retardation will be analyzed in future research works i.e. only special relativity has been included not the generalized version of it.

Introduction

In 1905, Albert Einstein with his Special Relativity completely revolutionizes reality and the understanding of the nature of time. He had shown that the flow of time for an observed body may not be the same for the observer [2]. The passage/flow of time is dependent upon the body's motion. The well-known formula of the time dilation is:

$Time_{stationary} = (Time_{moving})\gamma$

Where $\gamma = 1/\sqrt{1-(V/C)^2}$,

V is the velocity of the observed body less than C relative to the observer

C is the Speed of light in vacuum.

Einstein had also shown us that the concept of past, present, and future is also relative. The certain events which an observed body claims that is happening in its present, the observer will claim that those certain events had happened in his/her past or will happen in his future [2]. The difference between their timeline is given by the formula:

VD/C^2 *(V can be positive or negative depending upon the direction of motion)*

Where V is the velocity of the observed body relative to the observer,

D is the distance between the observed body and the observer

C is the speed of light in vacuum.

Einstein's now concept predicts that if an observed body is moving away relative to an observer then the present happening events interpreted by an observer is considered past happened events by the observer and if the observed body moves toward the observer then the present happening event interpreted by it Is considered future happening event by the observer. The problem is, it does not answer the questions like how could body's interpreting events which belong to different timeline belongs to the same timeline(as conventional idea says that the observed body does not travels into the past so it and the observer belongs to the same timeline). And the concept does not well define the situation i.e. the concept of time dilation and Einstein's now concept are itself incomplete. The idea of timeline interchange says the present events interpreted by the observed body is past happened events for the observer because the observed body relative to the observer has traveled into the past of the observer's timeline watching events happening now from its perspective but past happened events for the observer's perspective. And as the rate of time for the observed body only dilates not reversed so it doesn't travel into its past. From centuries physicists are struggling to understand the

meaning and nature of time but yet it remains one of the biggest puzzles encountered by human minds. This paper will surely help to make progress in understanding the true nature of time.

Procedure

Assumptions

The proposed work depends on some assumptions which are indeed mandatory to introduce first before analyzing the further description of the problem:

1) *The symbols representing the timeline:*

A= Present of A

B= Present of B

A'= Past of A

B'= Past of B

A''= Future of A

B''= Future of B

B ∈ A'= Present of B belongs to the past of A

(B ∈ A or A ∈ B, same thing.)

2) The Lorentz factor is symbolized as **ɣ** *or* **Γ** *whose Value is* equals to, **1/√ 1-(V/C)^2**
Γ=1/√1-(V/C)^2[2]
Where, V= velocity of the object, and
C= speed of light in vacuum

3) The difference between the now(s) is by an amount

-ve or +ve VD/C2 [2] provided that the direction of motion matters.

4) *If B is moving away or toward from A, then B leaps into the past and belongs to A's past and A belongs to B's future i.e.*

A ∈ B''

A' ∈ B

5) *Taking value of speed of light approximate to* ***300,000,000m/s***

Analyzing the assumption no.2,

Imagine, two highly advance robots A and B standing in a very large field but completely dark with no air or any object which can scatter light and A has a piece of glass. They are in a very large field on another planet, (it depends upon the reader's imagination where he/she imagines the robots) around 400000000m in length and 500000 m in breadth. Then at 4:59:59 PM, robot B started moving with a velocity of 0.8C (around, 240000000 m/s) away from A. Then the events happening "Now" with respect to B had happened in the past with respect to A by an amount VD/C^2 *[2]*

So, one second after travelling,

V= 240000000 m/s

D= 1second multiply by 240000000

= 240000000 m

C= 300000000 m/s

$VD/C^2 = (240000000)^2/(300000000)^2$

= 0.64 seconds

For more clarification what it means,

If 1 second has elapsed on A's clock then,

$T_{moving} = T_{stationary}$ *divided by Lorentz factor*

$T_{moving=}$ *1 divided by* $1/\sqrt{1-(V/C)^{\wedge 2}}$

= 0.59999999999 has elapsed for B

So, in B's clock timing is 4:59:59.59999999999 PM.

So, if B says some certain event happens "NOW" which is at 4:59:59.59999999999 PM then A will say that the certain event had happened in his/her past [2] i.e.

= 5:00:00 PM – 0.64 seconds

=4:59:59.36 PM (this is what Einstein's now concept is)

Suppose because of some mysterious source a ray of light touched the glass piece and this is the event happened "NOW" with respect to B. So suppose at 4:59:59.59999999999pm the light fell

into the glass piece with respect to B but A will claim that the light has hit the glass at 4:59:59.36 PM.

For B the event happens at 4:59:59.59999999999 pm, but A had seen that particular event at 4:59:59.36 pm. How could this be possible?

Even if B will post process that light took time to reach it from A which is = 0.8 seconds. Then also 4:59:59.59. 59999999999 – 0.8= 4:59:58.79999999999 Pm which contradicts with A's time.

How events happened in a different timeline can coincide?

This is the problem mentioned in the abstract section which Einstein's now concept itself is incapable of answering.

This paper gives a proposal for well defining the situation and justify the answer to the question How could this be possible which had not done by prior researches.

If we apply the assumption no. 1, then the problem is totally resolved.

$A \in B''$

$A' \in B$

First, we need to understand what the assumption no. 1 is really trying to explain. Assumption no. 1 is saying that when the motion is taken into the account, there is a timeline interchange. B traveled to A's past because of his/her motion and watching the event happening "NOW" from his/her perspective. But for A the same event happened in past [2] and there is no problem in defining the situation both the perspective has a valid point (as B do not know that he had travelled into the past).

For the curious reader who wants to know why it leaps into past?

The answer is simple. For B the rate of flow of time has been dilated relatively to A because of his motion that is the main reason B leaps into the past.

The equation of timeline interchange

A will say it has seen light at 4:59:59.36 PM but due to the finite speed of light, the light will take some time to reach B from A. The time light will take to reach B is:

Time= Distance/Speed

Time= 240000000/300000000

Time= 0.8 seconds

So, if A will say that the light it has seen at 4:59:59.36, it means for A light reached the glass piece at 4:59:59.36 – 0.8 seconds

= 4:59:58.16 PM

So it means B has traveled to this above time in the past.

Which means the amount of leap is:

= 5:00:00PM–4:59:58.16PM

(I have taken 5 PM instead of *4:59:59.59999999999 because initially, B must belong to A i.e. 5:00:00 PM but as time dilates it traveled into the past)*

= 1.44 seconds

Further concludes that, $1.44 = D/C + VD/C^2$

So the amount of time leap B had done into the past in the case of moving away from a particular object is,

$$\underline{\boldsymbol{D/C + VD/C^2}}$$

Where D= distance between the two objects

C= speed of light in vacuum

V= Relative velocity between two objects.

Now Let us focus on the second part of the assumption i.e. moving toward.

Equation of amount of leap- In case of moving toward

Now imagine, the field is twice the original length i.e. 480000000 m. And now, robot A and B is situated at the end of the field. Now, B starts moving at speed 0.8 c at 4:59:59 PM i.e. 240000000 m/s. And 1 second elapsed so the distance between A and B is 480000000 – (240000000 X 1) i.e. 240000000 m. So, now suppose a ray of light hit the glass piece in the hand of B at the instant when 1 second has elapsed. So the light ray reflected in such a way that it directly fell into A's eye. But because of Einstein's "Now Concept" [2], B will say it has happened at 5:00:00 PM but A will say no it has not happened yet. The equation will predict that:

V= 240000000

D= 240000000

$VD/C^2 = (240000000)^2/(300000000)^2$

*= **0.64 second***

And time light will take to reach A from B

= Distance/Speed

= 240000000/300000000

*= **0.8 second***

So now, for A light will hit the glass piece at:

= 5:00:00PM + 0.64 seconds

= 5:00:00.64 PM

Similar to situation one, B will travel to A's past so for A the light reached the glass will be

= 5:00:00.64 PM- 0.8 seconds

= 4:59:59.44PM

So, it means in this case B has traveled into the past to this above time.

The amount of time leap by B into the past is:

5:00:00PM – 4:59:59.44PM

= 0.16

Which further concludes that $0.16 = D/C - VD/C^2$

The mathematical equation for this case is:

$D/C – VD/C^2$

Where, D= distance between the two objects

C= speed of light in vacuum

V= Relative velocity between two objects

Conclusion and the consequence of the current theory

In 1905, Einstein discovered how motion affects the passage of time which leads to the fact that how my now may not be the same for anyone else's now. And it has been seen here that when these two effects (time dilation and now concept) taken into account, it results in an astonishing conclusion that an object which is in motion leaps into the past (travels to the past) and there is a leap in the unfolding of events into the future by an amount of $D/C + VD/C^2$ *or* $D/C - VD/C^2$ *provided that the direction of motion matters, after coming to the state of rest. But the current theory one some consequence:*

When we took motion into account then we leap into the past but in the past where we leap there is already an object i.e. you, are present so why cannot when we move we meet ourselves in the past? The reason is simple, our present actions affect our past, in this case, our present motion causes a leap into the past for us but it also causes our past to leap into its past further, by the same amount. But not only does our past leaps into its past, but our future also does the same. When we leap into our past then we do not belong to our present timeline so it can't be empty (as the object has traveled to the past and not present in its present) so our future leaps into its past by the same amount to fill the empty space in timeline. To paraphrase, "our present actions indeed affect our past and future".

Discussion

Q.1) Do Einstein's now concept itself says that an object in motion leaps into the past?

Ans. No, Einstein's now concept not itself says that an object in motion leaps into the past, when one extends it we get to know.

Q.2) what is the significance of introducing the idea of 'timeline interchange'?

Ans. Einstein's theory was not capable of describing the situation explicitly. The main significance of introducing the 'Timeline interchange' i.e. an object leaps into the past, is that it justifiably explains the situation that my now is past of someone else because I have traveled to

his past and watching event 'now' with respect to me but for him the event had already happened in his past.

Q.3) why the object which is in motion leaps into the past?

Ans. As the object starts moving the rate of flow of time for him is comparatively slow to the rest objects. So this is the main reason it travels/leaps into the past of rest objects.

Q.4) from the perspective of timeline interchange, if my now is past of someone else then I traveled to his/her past. Then if my now is future of someone else then did I travel into future?

Ans. No, you will not travel into the future. The timeline interchange gives us two equations of the amount of leap into the past. One is for moving toward from any frame of reference and second is in a situation where you will move away from some frame of reference. Einstein's now predicts, if I am moving toward someone then my now happening events will be future events for the person with respect to I am moving. So, timeline interchange predicts that the amount of leap in past while moving towards some frame of reference is in such a way that the finite speed of light takes time to reach from the moving object to the stationary object and makes the now happening events with respect to moving object but will happen event for stationary object because of the finite speed of light.

Q.4) Can you give an intuitive idea of the 'timeline interchange'.

Ans. Intuitively, imagine you are sitting in your room talking with your sister/friends and at 5 pm you took your time travel machine and go to 1 hour before the current moment. Then, in your watch the time would not be reversed, it will tick as it does when you were in your room. But when finally you reach 1 hour before the current moment you will see all the events that happened before or for you the events are happening now but for your sister/friends waiting for you into the room the events that are happening now for you had happened for them. This case is exactly equivalent to the above case, the difference is you know that you have traveled into the past but B do not know that it has travelled into the past

Limitations of this research work

However, our study has several limitations. It predicts that there is a leap in the unfolding of events in time but the research work is unable to justify the reason for the leap. And if one closely look into the theory, the propose theory has a hidden paradox. The amount of leap into the future has two different values $D/C+VD/C^2$ *or* $D/C-VD/C^2$ *depending upon the direction of motion. Imagine there people B in the east, C in the west and A in the middle of the two so when A travel toward B then it will simultaneously travel away from C (Note- this situation is an*

exceptional case of Relativity Simultaneity). So, A has travelled in the past of B by an amount $D/C-VD/C^2$ but simultaneously it travels into the past of C by an amount $D/C+VD/C^2$. This apparent problem not rises only in the case of two different directional reference frame but also exist for single directional (same directional) reference frame. Imagine, three objects A, B and C, A is moving away from B and C and it should be noted that distance from A to B and distance from A to C are different values. So, again the object A has to travel into two past simultaneously as the distance is different. How can this be possible? A, a unique object, travels into two past simultaneously (intuitively, imagine you decided to go into the past with the help of your time machine, when you were a child and when you were not being born simultaneously). The proposed theory is incapable of describing the solution for the apparent paradox.

Yet the work has well defined why there is 'timeline interchange' for an object which is in motion and the new property of time. Hope my limitations would be someone else's inspiration.

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