Special Relativity and Time Travel

The Lorentz Contraction equation was first proposed by Dutch physicist, Henrik Lorentz. It is a subjunction to the Special Relativity Theory. It illustrates how length can shrink for moving bodies and time can expand for the same bodies. I have read this account from various authors and of course encountered it in Einstein's original paper on Special Relativity. The theoretic is quite sound. However, I have begun to wonder if this equation can actually explain reverse time travel. I want to approach the idea using elementary calculus. First, let's examine future time travel.

The variables are:

L_m = the moving length of a body
L_r = the rest length of a body
C= the speed of light
V= velocity of a moving body

The Lorentz Contraction is as follows:

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

This equation tells us the change in moving length relative to rest length as velocity, approaches the speed of light.

By algebraic rearrangement we can rewrite this equation as

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

If we take the limit of both sides of this equation as v approaches c, we get:

$$\lim_{v \to c} L_m = \lim_{v \to c} L_r \sqrt{\left(1 - \frac{v^2}{c^2}\right)} = 0$$

Or as moving length and rest length both approach c, their difference shrinks to zero, thus the equation is called the Lorentz contraction. But, we can replace the length metric terms with their time metrics, T_m and T_r and rewrite the same equation as

$$\lim_{v \to c} T_m = \lim_{v \to c} T_r \sqrt{\left(1 - \frac{v^2}{c^2}\right)} = 0$$

Now we have as moving time approaches c, rest time approaches zero. Or in other words time slows downs for objects at rest relative to those in motion; time dilates so to speak

And now comes the really interesting part that I've considered. Suppose we allow supraliminal velocities? What would happen to this equation in that event? First, let me point out the actual velocity of light is approximately 300,000 Km, but since we are taking the ratio of moving velocity to the speed of light, we can ignore this rather large number. If v>c is true, the size of the numbers themselves is unimportant. We just have to choose any number x for v such that when squared and divided by c^2 it would yield a number > 1. If this can happen, then our relativistic equation would become a complex one. As an example we assume v^2 =450,000,000,000 (i.e. approx. 670,820 Km per sec) and c=90,000,000,000 Km per sec (i.e. c^2).

$$\lim_{v \to >c} T_m = \lim_{v \to >c} T_r \sqrt{\left(1 - \frac{450000000000}{90000000000}\right)} = 0$$

This simplifies to

$$T_m = T_r \sqrt{(-4)} = T_r 4i$$

This equals

$$T_m == 4iT_r$$

What is this equation telling us? Is it meaningful in relativity physics? Perhaps not, yet it was derived easily from the algebraic relations established. I believe it can be made meaningful. Remember that as we approached c with v increasing time slowed down to very near 0. Now we've allowed v to exceed c and have arrived at a complex equation. This complex equation is really a complex function. It is well known in group theory that all complex functions are cyclical. That is, they vary between real-valued and complex-valued functions. If we allow our velocity v to continue increasing relative to c, then we will arrive at another real-valued function as shown below.

Let's square both sides of the above complex equation. We will have the following:

$$\left(T_m\right)^2 = = \left(4iT_r\right)^2 = \left(T_m\right)^2 = -16\left(T_r\right)^2 = \left(T_m\right)^2 = -16\left(T_r\right)^2$$

If $(T_r)^2$ =1, (*representing our initial time, which is an assumption and therefore a possible error*) then our equation becomes

$$\left(T_m\right)^2 = -16$$

This means that we travel backwards in time by 16 light years, if we allow v to exceed c. If we rearrange this equation and set it to zero, we have

$$\left(T_m\right)^2 + 16 = 0$$

This can be factorized as

$$\left(T_m - 4i\right)\left(T_m + 4i\right) = 0$$

This means we have either –4*i* or +4*i* as roots to this equation. Neither is meaningful in the real plane but as conjugate pairs they are—as –16 light years into the past. We can see that because complex equations are cyclical, we would continue to recede farther and farther into past as values of the term $\sqrt{\left(1-\frac{v^2}{c^2}\right)}$ increased in perfect squares.

Another Way to Reversed Time Travel

However, this is not how reverse time travel is usually presented. Reverse time travel was conjectured by Albert Einstein and Nathan Rosen in a concept that has now come to be known as the *Einstein Rosen Bridge*. This idea applies only at the level of electrons and uses quantum mechanics to show small particles in the region of a black hole could pass from one connected geometry to another.

Complex Cyclical Groups and Reverse Time Travel

As stated above complex functions are cyclic. Now lets see if, what I developed above leads to an infinite reverse time travel. I believe it would. Moreso, it would lead a moving supraliminal object to reverse time travel many many light years and also become infinitely far away from its rest state. In this section we will use algebraic set theory to shows that complex relations map a complex set C to a real set M in perfect squares infinitely. This means that once reversed, time travel would continue infinitely into the past.

Since the quantity $\sqrt{\left(1-\frac{v^2}{c^2}\right)}$ can generate any complex numbers that when squared (mapped to a real negative number) become larger real negative numbers if we assume initial time T_r^2 is 1, we can form the following set mapping.

If $v^2 > c^2$, then

$$\sqrt{\left(1-\frac{v^2}{c^2}\right)} \in set\ C \cdot \left(complex\right) C \mapsto M\left(real\right) by \circ$$

$$\left(\sqrt{\left(1-\frac{v^2}{c^2}\right)}\right)^2 \ni -\left(\sqrt{\left(1-\frac{v^2}{c^2}\right)}\right)^2 \Rightarrow -\infty$$ in M

Let’s put this into simple English.

If velocity v can exceed light speed c, then we can form a complex set C, that when squared becomes a negative real set of numbers M that will tend towards infinity in the real set of numbers M. This means as v becomes larger and larger in relation to c, and we assume initial rest time is 1 we would reverse infinitely into the past from our initial point in time. We would measure the reversal in light years. We know light travels great distance in a year, so, we would also travel far from our initial geometric position, though I am not considering that aspect in this analysis.

Our receding into the past would grow by a factor x^n where $n = -1 \; to -\infty$

Conclusions

If this analysis is correct, and I not sure it is, then reverse time travel would set up a paradox phenomenon as strange as future time travel. The moving object would be far away from it rest time as it would be if it traveled ahead in time, only much more.

It's interesting to note that if we were to replace the time metrics in the above equations with their space metrics the moving body would contract to infinitesimally small dimensions. It would actually tend toward infinite contraction. This would mean the quantity would contract to nothing. That is to say, exceeding light speed would make a body push itself virtually out of spatial existence, and that's even stranger.

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12/3/08