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On the Non-Feasibility of Special relativity

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ABSTRACT

This is the second of five related works on electromagnetic theory, special relativity, relativistic mass, inflationary universe theory, and general relativity. In this paper Einstein's special theory of relativity (STR) is shown to be incorrect for three principal reasons:(a) Einstein wrongly assumes in his proof that his necessary conditions are sufficient conditions, (b) his equation for mass is shown to be untenable, and (c) his theory is contradicted by this author's paper on electromagnetism. A critique of the lab experiments which purport to confirm STR is also provided. An alternative theory is proposed and analyzed in the third paper in this series.

INTRODUCTION

This paper is divided into three main parts which deal with the feasibility of the Special Theory of Relativity (**STR)**.In **Part 1**two proofs that vary in complexity are given which show that Einstein's necessary conditions are not sufficient conditions. The first of these proofs uses the same thought experiment employed in his paper, where it is shown that he didn't look at his own one-way results. Thus, his round-trip transformations are correct and necessary, but not sufficient. The second proof shows the often-used railroad car thought experiment in many textbooks also fails. In **Part 2** Einstein's equation for mass, which is derived from and dependent on **STR**, is shown to be an untenable theory. Then in **Part 3STR** is proved be incorrect as based on this author's paper on electromagnetic theory. Finally, in **Part 4** the experimental verification of **STR** is challenged. A replacement theory for **STR**, including relativistic mass, is covered in the third paper in this series.

THE MATHEMATICAL NON-FEASIBLITY OF STR

Introduction

In 1905 Einstein [4] assumed in his **STR** paper the following two postulates: (1) when properly formulated, the laws of physics have the same form in all inertial systems and (2) the measured speed of light in a vacuum is *c*, independent of the movements of the source and the observer. While it is assumed in this work the first postulate is valid, the problem lies with the second. In his paper Einstein requires as necessary conditions that moving objects and moving clocks must undergo certain length and time transformations that depend on a function, $\gamma(v)$, which is defined as follows:

(1.1.1)$\gamma(v)=\sqrt{[1/(1-v^2/c^2)]}$

In this paper four proofs are offered which show **STR** is untenable. These are: (a) a thought experiment similar to the one used by Einstein, (b) a thought experiment similar to the one used in many text proofs, (c) an analysis based Einstein's[4,5] equation for mass, and (d) a conflict with electromagnetic theory. In the next section a proof is offered which is similar to the one used in by Einstein in his **STR** paper.

One-Way Path in Co-Linear Case

Einstein's thought experiment is revisited here, where a pulse of light is sent along a moving rod lying on and moving on the *x* axis. As he only looked at round-trip passage times along the rod, he left open the question whether the required $\gamma(v)$ transformation function need to satisfy his second postulate would also work for one-way paths. He also failed to consider the situation when the pulse is moving at an angle α to the rod. It is therefore argued that Einstein derived necessary, but not sufficient, conditions for his required transformations. It is noted his analysis was somewhat similar to the one used in 1892 by Hendrik Lorentz [6], in which it was shown that the round-trip time for light in the apparatus used in the Michelson/Morley [7] experiment would be independent of any "ether flow" if distances in the direction of the flow were shortened by a factor of$1/\gamma(v)$, where v is the speed of the apparatus relative to the ether. As this experiment involved round-trip passage times of light with α=0, the analysis of Lorentz did likewise. Very important, so did the analysis of Einstein. Of the four proofs concerning the non-feasibility of **STR** in this work, the one given below is by far the simplest.

Consider first a fixed inertial frame of reference, **IFR**$_0$, and a rod with end points **A** on the left and **B** on the right. The length of the rod when it is stationary is L_0, as measured by a stationary ruler. If a pulse of light is emitted by a stationary source, the passage time, T_0, from **A** to **B**as measured by a stationary clock is determined by the following equation

(1.2.1)$L_0 = cT_0$

If the pulse is perfectly reflected from **B** back to **A**, then the total round-trip length is $2L_0$, and the total passage time is $2T_0$. Measurement issues concerning simultaneity and synchronicity are deferred to a later section, where it is shown there are no problems (as is the case in Einstein's paper).

Next, assume in a second experiment that the rod is moving along the x-axis at velocity v, and at t=0 the left edge (**A**) is at x=0. At this instant a pulse is emitted from a stationary source which travels along the moving rod. According to **STR**, the second postulate requires the length of the moving rod is reduced to $L_0/\gamma(v)$, as measured by a stationary ruler. However, as this transformation formula may be incorrect, it will be assumed the length is instead reduced to $L_0 /\Gamma(v)$, where $\Gamma(v)$is to be determined and compared to $\gamma(v)$. Intuitively, it is argued that the needed transformation for the outward path must be different from the one needed for the homeward path. It is somewhat akin to an airplane flying downwind and then returning upwind. Thus, as **STR** only finds the length and time transformations needed to satisfy the second postulate as applied to round-trip paths, this necessary condition is not sufficient. Even though the overall two-way transformation is correctly given by **STR**, the individual ones needed for each one-way trip differ from each other. In this proof the required transformation function, $\Gamma(v)$, is shown not to be $\gamma(v)$ in the one-way experiment, so that this proves **STR** is in error.

With stationary instruments, assume the one-way transit time from **A** to **B**in the moving rod experiment is T. Then the travel distance D is given as follows, assuming the moving rod length is $L_0 /\Gamma(v)$:

(1.2.2)$D = cT = L_0 /\Gamma(v)+ vT$

The extra vT term in **(1.2.2)** is included to account for the fact that the right edge moves a distance vT in time T, where all measurements are with stationary instruments. Solving for Tin **(1.2.2)**yields:

(1.2.3)$T = L_0 / \{(c- v)\Gamma \}$

For convenience, the v arguments here and elsewhere are understood. Now suppose in this experiment that a ruler and clock are sitting on the moving rod, and the clock registers T^+ for the one-way passage time when the source is stationary in **IRF**$_0$. Based on the second postulate, this measured time is independent of the movement of the source, so T^+ is the same as if the pulse were instead emitted from a source moving at c. Also, from the first postulate the laws of physics have the same form in all inertial systems. Thus, from these considerations the times registered by the moving clock in the moving rod experiment and the stationary clock in the stationary experiment have the same values, even though their tick times are different. Therefore, the following obtains:

(1.2.4)$T^+ = T_0 = L_0 / c$

From **STR** the moving clock time, T^+, and the stationary clock time, T, used in the moving rod experiment are related as follows (where, once again, $\Gamma$is used instead of γ) :

(1.2.5)$T^+ = T/\Gamma$

Thus,

(1.2.6)$T = T^+\Gamma$

From **(1.2.3)** - **(1.2.6)**,$T = L_0 / \{(c- v)\Gamma\} =T^+\Gamma=T_0\Gamma$. Therefore:

(1.2.7)$L_0 /T_0=\Gamma^2(c-v) = c.$

Thus, from **(1.2.7)**, $\Gamma^2= c / (c-v)$, and the following obtains:

(1.2.8)$\Gamma= \sqrt{[1/ (1–v/c)]}$

It is seen from **(1.2.8)** that $\Gamma(v)\neq\gamma(v)$, and it is therefore concluded that **STR** is not feasible. Strangely,**(1.2.8)**agrees with the findings of Einstein in the first part of his paper, but for some reason he didn't stop there. Instead, he found the round-trip time. As shown in the next section, the results of a round-trip analysis will satisfy **STR**.

Round-Trip Path

The above one-way problem would have been seen by Einstein in his proof if he had halted his analysis at this juncture, and he would have concluded that the required $\gamma(v)$ transformation function for the round-trip differs from the one-way trip value. Instead, he considered the total round trip time, T_{tot}, which is given as follows:

(1.3.1) $T_{tot}=T_1+T_2$

In **(1.3.1)** T_1 is the passage time to the right, and T_2 the passage time to the left, using stationary instruments. Note that T_1 has already been found as T in **(1.2.3)**, as follows:

(1.3.2) $T_1 = L_0 / \{(c-v)\Gamma\}$

It is easy to show that the return time, T_2, is found by replacing v with $-v$ in **(1.3.2)**. Thus:

(1.3.3) $T_2 = L_0 / \{(c+v)\Gamma\}$

The total time for the round-trip, T_{tot}, as measured by stationary instruments, is therefore given as follows:

(1.3.4) $T_{tot}= T_1+ T_2 = L_0/[\Gamma(c-v)] +L_0/[\Gamma(c+v)]$

From **(1.3.4)** and elementary algebra:

(1.3.5) $T_{tot}=[2cL_0/\Gamma] / (c^2-v^2)$

From **(1.2.5)** it is clear that $T_1^+ = T_1/\Gamma$ and $T_2^+ = T_2/\Gamma$. Thus,

(1.3.6) $T_{tot} = T_1+ T_2 = \Gamma(T_1^+ + T_2^+)$

Since from **(1.2.4)** $T_1^+=T_0$, then by a similar argument, $T^{2+}=T_0$. Thus,

(1.3.7) $T_{tot} = 2\Gamma\, T_0= 2\, \Gamma\, L_0 / c$

From **(1.3.5)** and **(1.3.7)**:

(1.3.8) $[2cL_0/\Gamma] / (c^2-v^2) = 2\, \Gamma\, L_0 / c$

Solving **(1.3.8)** for Γ yields

(1.3.9) $\Gamma = \sqrt{[1/(1 -v^2/c^2)]}$

This equation for $\Gamma(v)$ agrees with **(1.1.1)** for $\gamma(v)$. Thus, Einstein's necessary condition is correct. However, as has already been shown, this is not a sufficient condition. A similar result will be shown in the next section which considers all α over $0\leq\alpha\leq\pi/2$ for one-way trips.

One-Way Solutions for $0\leq\alpha\leq\pi/2$

In this section the one-way problem is examined for all α over $0\leq\alpha\leq\pi/2$, where the rod is again moving along the x-axis at velocity v. Though **STR** has already been shown to be mathematically non-feasible for the one-way case when α=0, this section is offered because textbooks often study the one-way case with a thought experiment where $\alpha=\pi/2$. It will be shown that **STR** is valid for one-way trips only for this single value of α. Since the experiment studied here involves a pulse travelling at an angle α to the rod, it is difficult to use the approach employed in **Section 1.2**.As an alternative it is convenient to consider a railroad car moving in the x direction at velocity v, where a light source situated inside at the left corner at **A** emits a pulse at an angle α to the floor. It is then perfectly reflected off the roof and ends up at the right corner at **B**. This is a more general thought experiment than the usual textbook approach where the light pulse is directed vertically upward (at $\alpha=\pi/2$). The situation is as shown below in **Figure 1**.The stationary car has a width W_0 and height H_0 as recorded by stationary instruments. The path of the pulse in the stationary case is the solid line **ACB**. According to Einstein's first postulate, this is also the path as viewed inside the car when it is moving. To a stationary observer using stationary instruments outside the moving car, the width undergoes a contraction in **STR** and measures W_0/γ, as shown in the figure. Note that the height, H_0, as shown in the figure is not contracted according to **STR**.

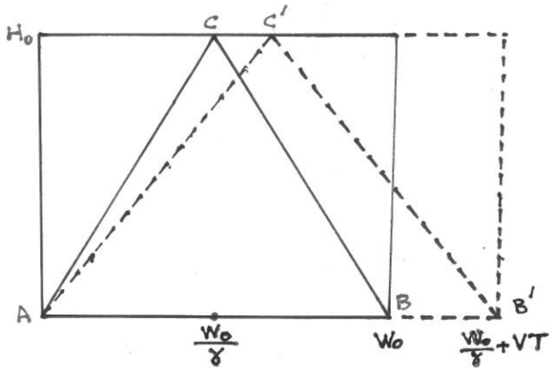

Figure1. *Railroad Car Experiment Assuming Str*

From **Figure 1** the path as viewed by an outside observer is shown as **AC′B′**. In the stationary case the total one-way distance is D_0, which is seen from the figure as the line **ACB**, as follows:

(1.4.1) $D_0 = 2 \sqrt{[H_0^2 + (W_0/2)^2]}$

The stationary one-way passage time, T_0, is found from:

(1.4.2) $D_0= cT_0$

It is convenient to define the dimensionless variable, k, as follows:

(1.4.3)$k = \cot(\alpha) = W_0/(2H_0)$

From **(1.4.1)**, **(1.4.2)**, and **(1.4.3)**:

(1.4.4)$T_0 = [2H_0/c]\sqrt{[1+k^2]}$

Now suppose the car is accelerated to a velocity v in the x direction. According to **STR**, the path inside the car will be **ACB**, and from the first postulate the measured values of the width W^+ and travel time T^+ will be unchanged from W_0 and T_0. Thus, $T^+ = T_0$, and

(1.4.5)$W^+ = W_0$

Then, from **(1.4.4)** and **(1.4.5)**:

(1.4.6)$T^+ = T_0 = [2H_0/c]\sqrt{[1+k^2]}$

Next, consider the situation as seen by an outside observer using stationary instruments. The path of the pulse viewed by the observer is **AC′B′**, as shown in **Figure 1**.

Using stationary instruments, note that the distance travelled along the x-axis assuming **STR** is $W_0/\gamma + vT$, where W_0/γ is the width of the moving car, and the distance the car moves to the right during time T is vT. With stationary instruments the total distance travelled, D, and total one-way passage time, T, are given by simple geometry in the following equation:

(1.4.7)$D = cT = 2\sqrt{\{H_0^2 + [(W_0/\gamma + vT)/2]^2\}}$

Squaring cT as given by **(1.4.7)** and replacing $W_0/2$ with kH_0 yields:

(1.4.8)$c^2T^2 = 4\,[H_0^2 + k^2H_0^2/\gamma^2 + kH_0vT/\gamma + v^2T^2/4]$

It is straightforward to show the quadratic equation in T as given by **(1.4.8)**has one positive root, and the solution for T is as follows:

(1.4.9)$T = [2H_0/(c^2-v^2)][kv/\gamma + \sqrt{\{k^2v^2/\gamma^2 + (c^2-v^2)(1+k^2/\gamma^2)\}}]$

Based on **STR**, the measured time T using stationary instruments is greater than the measured time $T^+ = \hat{T}_0$inside the car using moving instruments. This relationship is given as follows:

(1.4.10)$T_0 = T/\gamma$

From **(1.4.9)**and**(1.4.10)**, and after re-writing, the following obtains:

(1.4.11)$T_0 = [1/\gamma]\ [2H_0/(c^2-v^2)][kv/\gamma + \sqrt{\{k^2v^2/\gamma^2 + (c^2-v^2)(1+k^2/\gamma^2)\}}]$

After replacing T_0in **(1.4.11)** with $T_0 = [2H_0/c]\sqrt{[1+k^2]}$ from**(1.4.6)** and some elementary algebra , the result is:

(1.4.12)$[\gamma^2/c][c^2-v^2]\sqrt{(1+k^2)} = kv + \sqrt{[k^2v^2 + (c^2-v^2)(\gamma^2 + k^2)]}$

Equation**(1.4.12)** is the final result in the one-way case. It defines the required γ function if **STR** is correct. If the theory is feasible, γ as defined by this equation must satisfy **(1.1.1)** and ipso facto it must be independent of k, which is a function of α. In the case where $\alpha=0$ ($k=\infty$) it is easy to show that $\gamma=\sqrt{[1/[1-v/c)]}$, which agrees with Γin **(1.2.8)**and checks with the results of **Section 1.2**, and not with **(1.1.1)**. However, when $\alpha=\pi/2$ (i.e.,$k=0$), then $\gamma=\sqrt{[1/[1-v^2/c^2)]}$, which agrees with **STR** and **(1.1.1)**. It turns out this is the only value of α in the one-way case in the range, $0\leq\alpha\leq\pi/2$, that satisfies **(1.1.1)**. This can be proved by substituting **(1.1.1)** into **(1.4.12)**,which eventually reduces to:**(1.4.13)**$c\sqrt{(1+k^2)} = kv + c\sqrt{(1+k^2)}$

From**(1.4.13)**it is seen that the only solution is $kv=0$. Thus, the only solution for$v\neq0$ is $k=0$, or $\alpha=\pi/2$. It is unfortunate that this case yields a feasible solution because many texts use it as the thought experiment in their proofs.

Round-Trip Solutions for Arbitrary α

In this section the round-trip problem is analyzed for $0\leq\alpha\leq\pi/2$.Though not proved by Einstein[4], it turns out that **(1.1.1)** is satisfied for all α. The proof uses the one-way results already found in the prior section. Defining T_1 and T_2 as the passage times to the right and left, as measured by stationary instruments, the same derivation technique used in the prior section yields:

(1.5.1)$T_1 = [2H_0/(c^2-v^2)][kv/\gamma + \sqrt{\{k^2v^2/\gamma^2 + (c^2-v^2)(1+k^2/\gamma^2)\}}]$

(1.5.2)$T_2 = [2H_0/(c^2-v^2)]\ [-kv/\gamma + \sqrt{\{k^2v^2/\gamma^2 + (c^2-v^2)(1+k^2/\gamma^2)\}}]$

Accordingly, on summing T_1 and T_2as given by **(1.5.1)** and **(1.5.2)**:

(1.5.3)$T_1 + T_2 = [2H_0/(c^2-v^2)]\ [\sqrt{\{k^2v^2/\gamma^2 + (c^2-v^2)(1+k^2/\gamma^2)\}}]$

Based on **STR**, clocks inside the railroad car run slower than stationary clocks on the track. As the outside measured round-trip time is T_1+T_2, and as the inside round-trip time is $2T_0$, the following obtains from **STR**:

(1.5.4) $2T_0 = (T_1 + T_2)/\gamma$

From **(1.4.6)**and**(1.5.4)**:

(1.5.5)$T_1+T_2 = [4\gamma H_0/c]\sqrt{[1+k^2]}$

Thus, from **(1.5.3)** and **(1.5.5)**: **(1.5.6)**

$[4\gamma H_0/c]\sqrt{[1+k^2]} = [4H_0/(c^2-v^2)]\text{x}\ [\sqrt{\{k^2v^2/\gamma^2 + (c^2-v^2)(1+k^2/\gamma^2)\}}]$

Cancelling $4H_0$ from each side of **(1.5.6)**and rewriting yields:

(1.5.7)$[\gamma^2 (c^2-v^2)/c]\sqrt{[1+k^2]} = \sqrt{[k^2v^2+ (c^2-v^2)(\gamma^2+k^2)]}$

Inserting γin**(1.1.1)**into**(1.5.7)**yields :

(1.5.8)$\sqrt{[1+k^2]} = \sqrt{[1+k^2]}$

As **(1.5.8)** is an identity which is satisfied for all *k*, the round-trip case is mathematically feasible in satisfying **STR**. However, as pointed out in the prior section, it is not a feasible solution for one-way paths.

Simultaneity and Synchronicity (S&S)

S&S turns out not to be a problem in both this work and in Einstein's **STR**. As the railroad car study is totally general for all α, only this experiment will be analyzed here. Suppose three clocks (stop watches) are placed on the track at points X_1, X_2, and X_3, to be determined below. As the clocks are in a stationary frame of reference, they can be synchronized at X_1, X_2, and $X_3$by the method advocated by Einstein. X_1 is arbitrarily defined as zero.

When the left corner of the railroad car passes X_1, the clock at X_1 is stopped (at C_1), and a light pulse is emitted inside the car at an angle α, as shown in **Figure 1**.

When the pulse arrives at the right car corner, which definesX_2 on the track, the second clock is stopped (at C_2). When the reflected pulse returns along the reverse path in the car to the left corner, this definesX_3 on the track, and the third clock situated there is stopped (at C_3).

The values of X_1, X_2 and X_3 are all known from the mathematical deliberations of the previous sections. Also, T_0 is known from $T_0=W_0/c$. Finally, the passage times T_1 and $T_2$are evaluated by the differences in the stopwatch readings.

Thus, $T_1=C_2-C_1$ and $T_2=C_3-C_2$.There is no issue with simultaneity since the clocks are right where they need to be at the critical times (Einstein's "close proximity").Thus, all the transit times used in the proofs are measurable.

Omni-directional length transformations

Though **STR** uses uni-directional transformations, where dimensions orthogonal to the velocity are unchanged, it is straightforward to show that omni-directional transformations using $\hat{H}=H_0/\gamma$ in the railroad car experiment will likewise not work in general. This is obvious from the results for α=0 in**Section1.2**, where H_0 plays no role.

Problems With Mass

Introduction

In this part the theory developed by Einstein[4,5] concerning mass will be discussed and shown to have many problems which render the theory untenable. An alternate theory is proposed by the author in the third paper in this series of five. As Einstein's mass is tied to his STR, then the failure of one implies the failure of the other. Since STR has been shown to be mathematically non-feasible in Part 1, and since it will further be shown to be incorrect in the electromagnetic theory paper asoutlined in Part 3, it is concluded that Einstein's version of mass (and of kinetic energy) is in error. Notwithstanding this arguments in Part 3, the details of Einstein's treatment of mass will further be shown here in this part to have other serious problems.

Two Equations for Mass

While Einstein[4,5] wrote two papers concerning mass, only his paper concerning STR (i.e., Einstein[4]) will be considered herein because his other paper deals with the energy and mass of a plain wave. In Einstein[4] his STR equations for mass m and energy E are often written as follows:

(2.2.1)$m = m_0\gamma$

(2.2.2)$E = m\, c^2$

There are several very nice features of these equations. The first is that **(2.2.2)** reduces to $E(v)$-$E(0)=m_0v^2/2$ when v/c is small. Thus, the gain in energy when v is small is given by the standard formula for kinetic energy. Second, m->∞and E->∞ when v->c**.** Thus**,** it is clear that objects cannot be accelerated to c. However, in spite of these nice features, there are still some residual problems concerning the **STR** version of mass.

First, Einstein actually derives two equations for mass, and neither one is given by **(2.2.1)**. One of them he calls longitudinal mass(M_L) and the other transverse mass (M_T). Their equations are as follows:

(2.2.3)$M_L = m_0\gamma^3$

(2.2.4)$M_T = m_0\gamma^2$

In these two equationsm_0 is the stationary mass and γ is defined by **(1.1.1)**. It is noted that neither formula is the well-known m=$m_0\gamma$. Accordingly, it is difficult to understand how mass can be a property when it is not singularly defined, and not actually used by either definition.

Dependence of Mass on Velocity

Einstein's definition of longitudinal mass is shown by him to lead to his famous formula for kinetic energy (K), which is given as follows:

(2.3.1)$K = m_0c^2\,(\gamma - 1)$

This formula is often interpreted by the equation for total energy, $E=mc^2$, where $m=m_0\gamma$and E is the sum of the at-rest energy m_0c^2 and kinetic energy K. In this theory the total energy is therefore increased by the kinetic energy when the velocity of the object is increased from zero to v. Not with standing the difficulties in the definition of mass, another big problem with this theory is that everything depends on v, which in turn depends on the user's choice of **IFR**$_0$.Einstein partially gets around this problem by defining v as the increase from the at-rest value, and K as the energy to bring about the increase. To see that there is a problem with this view, consider two seemingly identical objects (#1 and #2) moving side-by-side. Object #1 was originally at rest in **IFR**$_1$and was accelerated to v_1. Similarly, object #2 was originally at rest in **IFR**$_2$ and accelerated to v_2. Since the two objects are now moving side-by-side, then in any common **IFR** the two velocities are the same. In such an **IFR**, the masses are therefore the same. However, as v_1 in**IFR**$_1$differs from v_2 in**IFR**$_2$the two objects have different masses. From this contradiction it is concluded that **STR** is in error. Another way of looking at it is that the properties, including masses, of two otherwise identical objects moving side-by-side do not depend on how they arrived at their present locations.

The obvious way out of this predicament is to conclude that mass is a property which is independent of how it arrived at a particular state. This line of thinking leads to the following conclusion:

(2.3.2)$m = m_0$

While it can be argued that **(2.3.2)** is a reasonable conclusion, this leaves open the question of why objects cannot be accelerated to c, and why objects moving at velocities close to c have large moment a. This issue is resolved in the third paper in this series of four.

A Kink in the Mass Equation

As a matter of convenience, in this section mass will be defined in the standard way, as follows:

(2.4.1)$m = m_0\gamma$

Actually, it makes no difference how it is defined in the following analysis, so long as it is a function of v. The conclusion will be the same. Assume a mass is initially at rest in **IFR**$_1$, so γ =1 and $m=m_0$ at this instant. If the velocity is increased from zero to x, then m is increased to $m=m_0\gamma(x)$. If the velocity is then further increased to $x+\Delta v$, then m is increased to $m_0\gamma(x+\Delta v)$, and the energy increase ΔE from $v=x$ to $v=x+\Delta x$ is given as:

(2.4.2)$\Delta E=m_0c^2[\gamma(x+\Delta v) - \gamma(x)]$

Next, change the **IFR** from **IFR$_1$** to, say,**IFR$_2$**, where all velocities are increased by a value of x>0. Then the new velocity, $\hat{v}$, corresponding to a given value v is $\hat{v}=x+v$, and therefore $v=\hat{v}-x$. If mass is a property, then the mass $\hat{m}_0$ in **IRF$_2$** at $\hat{v}=0$ is presumed to be the same as the mass in**IFR$_1$** at $v=x$. Then $\hat{m}_0=m_0\gamma(x)$. Otherwise, mass would not be a property and would be therefore be meaningless. Also, at any given $\hat{v}$, $\hat{m}=\hat{m}_0\gamma(\hat{v})=m_0\gamma(x)\gamma(\hat{v})$. The energy increase, $\Delta\hat{E}$, needed increase $\hat{v}$ from 0 to Δv, or from $v=x$ to $v=x+\Delta v$, is therefore given as follows:

(2.4.3)$\Delta\hat{E} = \hat{m}_0c^2[\gamma(\Delta v) - 1] = m_0c^2\gamma(x)\,[\gamma(\Delta v) - 1]$

From **(2.4.2)** and **(2.4.3)**, and a little algebra:

(2.4.4)$\Delta\hat{E} - \Delta E = m_0c^2[\gamma(x)\,\gamma(\Delta v) - \gamma(x+\Delta v)]$

It is straightforward to show that the energy difference given by **(2.4.4)** strictly negative for all Δv>0. This is obvious since the slope of the $m(v)$ curve is positive at $v=x$, whereas the slope of the $\hat{m}(\hat{v})$ is zero at this point. Thus, Einstein's first postulate is violated, and **STR** is not valid.

INVALIDITY OF STR BASED ON EM THEORY

Introduction

In Aucamp[1], which is the first work of this series of four related papers, this author presents a new **EM** theory of forces which is shown to be intuitively justified, theoretically proved, and experimentally verified. Briefly, the theory can be explained as follows: Consider a ray emitted by a moving charge q_1 at time t, and define **IFR**$_0$ as the inertial frame at this instant. Actually, the "ray" is the emission field emission over an infinitesimal period of time, dt. Suppose the ray arrives at moving charge q_2 at time $t+\Delta t$, where the position of $q_2$has moved from $\boldsymbol{r}(t)$ at the emission time to$\boldsymbol{r}(t+\Delta t)$, at the arrival, all as measured in **IFR**$_0$. Define $\boldsymbol{f}_0$ as the stationary Coulomb force at $\boldsymbol{r}(t+\Delta t)$. Further define V as the component of the q_2 velocity in **IFR**$_0$

moving in the direction of $\mathbf{r}(t+\Delta t)$when the ray arrives. Then the force $\boldsymbol{f}$ exerted onq_2 is as follows:

(3.1.1) $\boldsymbol{f}= \boldsymbol{f}_0 \{1 - (3/2)\ V/c + (1/2)\ V^2/c^2\ \}$

Several conclusions drawn from this study are as follows:

- Magnetic forces do not exist.
- All **EM** forces are due to electric fields.
- Light travels with respect to the source.
- The measured velocity of light at the observer is c-V.
- The force this ray exerts on q_2 depends on V.
- $\boldsymbol{f}$ ->**0** as V/c ->1

It is clear from these findings, especially (d), this theory is a complete refutation of the second postulate of **STR**. Also, from(f) it is seen that devices such as linear accelerators cannot push a charge to the value of c. However, **(3.1.1)** does not explain why the relativistic momentum at impact with another object can be significantly greater than m_0c. This problem is resolved in the third paper of this series.

Refutation of Some Well-Known Tests of STR

There are many well-known tests supporting **STR**. Perhaps the most common and persuasive involves experiments which use interferometers that are firmly set on the same base structure as the source and detector apparatus. The only moving parts, if any, are reflectors. Accordingly, tests of this kind cannot differentiate between **STR** and an alternate theory, **ALT**, which is defined below and discussed at length in this author's third work in this series:

ALT (Alternate Theory):

The velocity of light is c and remains at c with respect to the initial **IFR** of the source. Perfect reflectors do not become new sources.

The reason for this is that the source is not moving in these experiments. As Michelson/Morley[8] did not use rotating reflectors, their experiment provided no useful information for ruling out either **STR** or **ALT**. The same is true with the experiments of Babcock/Bergman[2],where the reflector was moving but both the source and detector were fixed. Thus, in this case the observed photons would have had the same velocity if either **STR** or **ALT** were correct. Choosing between these hypotheses requires varying the velocity of the source with respect to a fixed detector.

While it is true that certain indirect experiments have seemingly corroborated **STR**, it is argued that extraneous important factors or unknown physical processes have been involved, such as gravity and acceleration. One of these was the study of De Sitter[3],in which the light source from binary stars was examined. De Sitter argued that the emissions from points on the stars that are further away from the earth but moving relatively faster toward it would eventually catch up with the emissions from points closer to the earth and moving relatively slower toward it (assuming Ritz is correct). This would result in certain strange behavior at the detector, which was not in fact noted. However, this thesis may be questioned by the following argument. Consider a pair of rotating twin stars, where in the hemispheres facing the earth a large number of radiating small areas (ΔA 's) are farther away from the earth and moving toward the earth faster than another large number of ΔA's which are closer and moving slower. Further consider any two such opposing areas and examine the streams of photons emitted. As the stars rotate, continuously replace these two areas with two new ones with the same relative angles with respect to the earth telescope. In effect, two continuous streams are thereby formed which eventually fuse together at the detector, independent of whether the photons are moving at the same speed or at different speeds. So in either case there would be an intermingling of rays at the detector with different frequencies (and possibly different velocities). Accordingly, it is argued De Sitter's findings are questionable. Thus, in conclusion, it is argued that experiments which purportedly confirm the second **STR** postulate do not properly differentiate between **STR** and **ALT**.

Final Conclusions

In **Part 1** it is shown by two separate methods that **STR** is theoretically non-feasible. One of these methods looks at the same thought experiment used by Einstein, and the results agree with it in the case of round-trip paths. However, even in his paper it is clear that the required transformations for one-way paths differ from the round-trip transformations. It is interesting that Einstein did not notice this or report it. The second thought experiment is similar to the familiar one in textbooks involving a light source inside a railroad car, where rays are allowed to move at an angle α

with respect to the floor. Once again, it is shown that one-way transformations differ from round trip transformations, except when $\alpha=\pi/2$. In **Part 2** difficulties arising from Einstein's definition of mass are shown to be untenable. As his **STR** and his theory of mass are intertwined, they both indicate that **STR** is not feasible. It is likewise concluded in **Part 3**that this author's paper on electromagnetic forces rules out the possibility that **STR** is a valid theory.

In **Part 4** the direct experimental evidence supporting **STR** is brought into question because these experiments are not based on moving sources (at best, only reflectors are moving).

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