A MODIFIED LORENTZ ETHER AND SHERWIN'S EXPERIMENT

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Abstract

Chalmers W. Sherwin conducted an experiment which he reported in *Physical Review A*, Vol. 35, No.9, May 1987. The experiment was ingeniously designed to detect the Lorentzian stress induced by the Fitzgerald contraction of macroscopic matter moving at a velocity, **v**. Briefly, an accelerometer was spun on the end of a spring. If Fitzgerald contraction was real, Sherwin expected the accelerometer to display a signal at twice the rotation frequency, due to the galactic velocity of the solar system.

The author's proposed modified Lorentz ether is described, including the increase of mass with velocity through the ether. Next, it is shown that the fault with Sherwin's expected results was, in fact, that he ignored the increase of mass with velocity. It is shown that the increase of mass, together with conservation of momentum, causes an elliptic orbit about the center flattened precisely in agreement with the Fitzgerald contraction. Thus, Sherwin's null result says: If the increase of mass with velocity is real, Fitzgerald contraction is real.

Introduction

Sherwin [1] conducted an experiment designed to detect Lorentz-Fitzgerald contraction. None was detected. But the null result contradicts the combined implication of two of my strongly held beliefs. First, I believe in a solid ether, which is a modified form of a Lorentz ether. Second, I believe in a relativity principle, which is a modified form of Poincare's principle. These beliefs are challenged by Sherwin's null results and have stimulated a carefull review of his experiment to determine why a null result was obtained.

I have modified Poincare's principle by inserting the word local in Whittaker's [2] translation.

> The *local* laws of physical phenomena must be the same for a "fixed" observer as for an observer who has a uniform motion of translation relative to him: so that we have not, and cannot possibly have, any means of discerning whether we are, or are not, carried along in such motion.

The motivation for the modification is to exclude long-distance phenomena, such as the cosmic background radiation, from consideration.

I have modified Lorentz's ether in a number of ways, but the modifications need to be related to the specific version of Lorentz ether which Sherwin set out to test. Sherwin used Lorentz's book, *The Theory of Electrons*, written in 1909, as the source of Lorentz's postulates. As paraphrased by Sherwin (with minor editing) these postulates were:

(1) There exists a preferred inertial reference frame, S, in which light propagates uniformly in all directions with the velocity c. (the "ether")

(2) The length of a rod moving uniformly in S with the velocity, v, is physically contracted in a direction parallel to its motion by the factor, $(1- v^2/c^2)^{1/2}$. (the Lorentz-Fitzgerald contraction)

(3) The frequency of a clock moving uniformly in S with a speed v is physically retarded by the factor $(1-v^2/c^2)^{1/2}$. [Sherwin notes that this hypothesis was newly added in 1909 and that in 1923 Lorentz pointed out that a rod-mirror clock which obeyed postulates (1) and (2) automatically obeyed postulate (3).]

(4) The physical contraction of postulate (2) is caused by the contraction of the electron-mediated bonds in macroscopic matter. [Sherwin notes that this postulate was somewhat vague in that it predated any models of the atom.]

The heart of the Lorentz ether constitutes postulates (1) through (3). The fourth postulate was an attempt to relate the transverse flattening of Lorentz's spherical electron model to the transverse shortening of rods. I would revise Lorentz's fourth postulate to read:

(4) All fields and potentials whose sources are moving are flattened in the direction of motion by the Lorentz-Fitzgerald contraction factor.

Postulate (2) and the new postulate (4) could obviously be combined to say that physical particles and their associated electric, magnetic, and gravity fields undergo a Lorentz-Fitzgerald contraction.

But yet another postulate is needed to complete the description of our modified Lorentz ether. Specifically, we state:

(5) The mass of physical particles moving at a speed v with respect to the frame S is increased by the factor, $(1-v^2/c^2)^{-1/2}$.

It is not clear why this postulate was not included by Sherwin. Perhaps Lorentz, in his 1909 book, did not talk about the mass increase with velocity through the ether. However, it is clear from other sources that Lorentz was aware of and included a mass increase phenomenon in his writings. In any case, this fifth postulate is clearly needed to make the null result of Sherwin's experiment compatible with our modified Lorentz ether. The mass increase is required if we have any hope of making spinning masses compatible with Poincare's principle.

Note that the Lorentz postulates have been modified to make them complete according to my own modified Lorentz ether theory. That does not mean that these postulates are foundational. They are the expected result of our more fundamental assumptions regarding the standing-wave structure of material particles in an elastic solid ether.

Before analyzing Sherwin's experiment in detail, the general picture of the relationship between the ether frame and any frame (physical object) moving through that ether is described in schematic form. Following this general discussion, a brief analysis of the Michelson-Morley experiment is provided. The Michelson-Morley analysis provides the groundwork for an analysis of Sherwin's experiment and is also beneficial in and of itself—since it is so often confused.

Background

Figure 1 is a schematic representation of the relationship between frames. At the top of the figure, a circle is used to represent the absolute ether frame. In my opinion, this frame coincides with the cosmic background radiation. There is no way to prove such a claim. However, whatever inertial frame is chosen, time can be treated as absolute and the speed of light can be treated as isotropic.

Lorentz Transformation

On the left side of the figure, a second circle represents an alternate inertial frame in which the speed of light is also assumed isotropic. The relationship between the two frames is defined by the

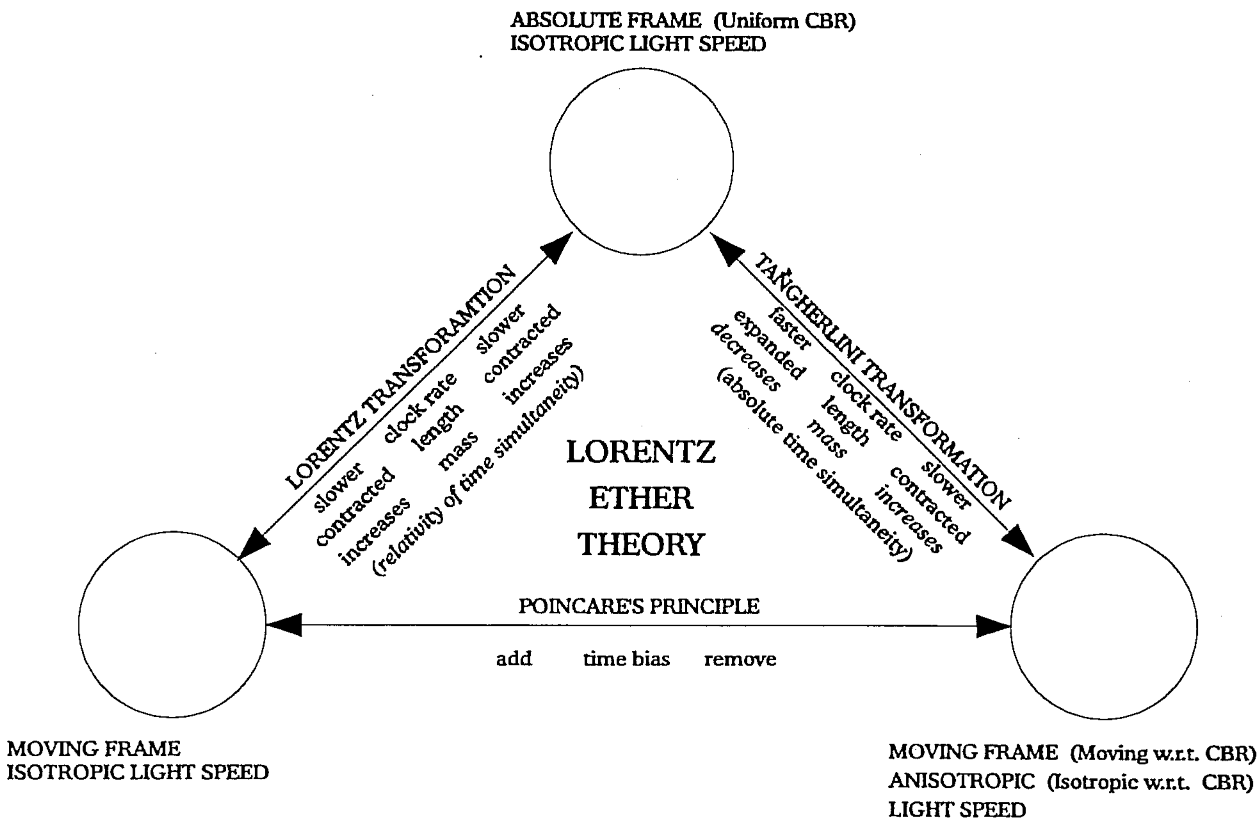

Figure 1 Relationship between frames

symmetrical Lorentz transformation. The special theory interprets the Lorentz transformation to imply that each of two inertial frames undergoing relative motion will see the other's clock running slower. In addition, the mass of any particle moving with respect to the inertial frame is assumed to be increased. Thus, the mass of objects in the other frame is assumed to be increased. The Lorentz transformation from the absolute frame, a, to the inertial frame, b, which is moving in the positive x direction is given by:

$$t_b = \gamma\left(t_a - \frac{v}{c}\frac{x_a}{c}\right) \tag{1}$$

$$x_b = \gamma\left(x_a - v\,t_a\right) \tag{2}$$

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

The inverse transformation is symmetrical and can be obtained simply by interchanging x_a with x_b and t_a with t_b and changing the sign from minus to plus. The mass stationary in frame b as compared to that same mass stationary in frame a is given by:

$$m_b = \cancel{\gamma} m_a / \gamma \tag{3}$$

And, even more strange than each inertial observer seeing the other's clock run slow, they also see each other's mass increased. Thus, the mass increase is symmetrical also; and the reverse transformation is associated with an interchange of the m_a and m_b in the above equation.

Tangherlini Transformation

On the right hand side of the figure an inertial frame is represented which is moving with respect to the absolute ether frame, but the speed of light is assumed to remain isotropic in the absolute frame. In this moving frame the speed of light is not isotropic, clocks run slower, lengths are contracted in the longitudinal direction, and masses are increased due to their absolute velocity. The transformation between the moving frame and the absolute frame is defined by the Tangherlini transformation [3] which is reciprocal rather than symmetrical. In other words, as logic demands, clocks at rest in the absolute frame run faster than clocks at rest in the moving frame; and lengths of physical objects at rest in the absolute frame are longer in the longitudinal direction than the same objects at rest in the moving frame. Similarly, the mass of an object is less when at rest in the absolute frame compared to its mass when at rest in the moving frame. The Tangherlini equations are:

$$t_b = \frac{t_a}{\gamma} \qquad (4)$$

$$x_b = \gamma\,(x_a - v\,t_a) \qquad (5)$$

and the mass equation is:

$$m_b = \cancel{\gamma} m_a/\gamma \qquad (6)$$

The inverse Tangherlini equations are:

$$t_a = \gamma\,t_b \qquad (7)$$

$$x_a = \frac{1}{\gamma}\,(x_b + v_b\,t_b) \qquad (8)$$

A subscript was added to the velocity because the same velocity value has different meanings in the two frames. The velocity in the absolute frame, a, is indicated by the absence of a subscript. The relationship is:

$$v = \frac{v_b}{\gamma^2} \qquad (9)$$

The mass relationship is the reciprocal and is given by:

$$m_a = \frac{\gamma m_b}{\cancel{\gamma}} \qquad (10)$$

Note that for the forward transformation (a to b) only the time equation is different for the Lorentz and Tangherlini transformations. The x coordinate and the mass transform identically.

Poincare's Principle

The line connecting the moving frame on the right with the same moving frame on the left is the result of Poincare's principle. In my opinion, the moving frame on the right represents reality. But it is indeed true that, for most practical purposes, the frame on the left, with assumed isotropic light speed, is a very useful fiction. The process of moving to the left side by invoking Poincare's principle means that the clocks in the moving frame are deliberately biased as a function of their longitudinal position such that the speed of light is measured as isotropic. This clock bias (and rate) can be computed in either frame by solving for the difference between equation (1), which was derived from the requirement that the light be isotropic in each frame and equation (4) which was derived assuming that the speed of light is isotropic only in frame a. Computing the bias directly as equation (1) minus equation (4) gives:

$$\tau = (\gamma - \frac{1}{\gamma})\, t_a - \gamma \frac{v}{c}\frac{x_a}{c} \tag{11}$$

This equation makes obvious an often overlooked fact: The Lorentz transformation achieves a slower running clock by actually increasing the clock rate, but then more than counteracting that effect with a changing clock bias as a function of position. For our purposes, equation (11) can be put in a more convenient form by converting to frame b. Substituting in for t_a and x_a and simplifying (being careful to distinguish between v and v_b) gives:

$$\tau = -\frac{v}{c}\frac{x_b}{c} \tag{12}$$

This arbitrary biasing of the clocks causes differences in the apparent velocity components in the longitudinal direction, which of course affects the apparent mass change with velocity, etc. When the clock bias is combined with the Tangherlini transformation, the Lorentz transformation results. However, the interpretation of the transformation is different from that of the special theory. The Lorentz transformation is seen as a useful fiction to simplify computations. As such, it can have no real physical effects associated with it. Thus, Lorentz boosts which cause Thomas precession in the standard SRT interpretation cannot be a correct explanation for the precession if the Tangherlini transformation constitutes the true description of reality. In other words, it is clearly invalid to use the Lorentz transformation to change frames in the middle of an experiment. But, it is valid to use the Lorentz transformation to map to an inertial frame moving with respect to the absolute frame to simplify computations, as long as one remembers that it is simply a useful fiction. In the sections below we will compare the view of Michelson-Morley and Sherwin's experiment using the Tangherlini transformation and then adding the time bias to get the Lorentz transformation.

Michelson-Morley Experiment

The Michelson-Morley experiment is continually being challenged, and radical explanations for the results are always being offered. But the Tangherlini transformation explains the results in a straightforward manner. The equations will also be illustrated by the use of an example. The discussion is based upon the use of the time of travel of a wavefront. This avoids questions of Doppler shift, which have confused a number of authors.

The transverse path

First, let us look at the two-way path transverse to the direction of motion. In this direction the distance to the mirror remains unchanged, but the path of the light beam travels an extra distance due to the motion. This distance measured in frame a is given by:

$$L_{am} = \frac{L_a}{\sqrt{1 - \frac{v^2}{c^2}}} = \gamma L_a \tag{13}$$

If we assume the transverse distance, L_a, is 300 meters (a large Michelson Morley experiment) and the speed of frame b is at 0.6 the speed of light (a very high speed to illustrate the effect), the value of γ will be 1.25; and the actual distance which the light beam travels, L_{am}, will be 375 meters.

Dividing twice (two-way) this distance by the speed of light shows that the reading of a clock stationary in frame a is larger (it is assumed that the clocks were set to zero at the time the light wavefront left the source) than the reading, T_a, which would be obtained if the rod were not moving.

$$T_{am} = \frac{2\gamma L_a}{c} = \gamma T_a \tag{14}$$

A clock in frame a would have read an elapsed time, T_a, of two microseconds for the total 600 meter distance of the journey when the experimental apparatus was not moving; but, when moving, the total elapsed time, T_{am}, will be increased to 2.5 microseconds.

But mapping this time reading to the moving clock via Tangherlini equation (4) shows that the reading of the frame b clock is still consistent with an apparent speed of light equal to c.

$$T_b = \frac{T_{am}}{\gamma} = \frac{2\gamma L_a}{\gamma c} = \gamma\left(\frac{T_a}{\gamma}\right) = T_a \tag{15}$$

Since the moving clock runs slow, the Tangherlini equation (4) says that the reading of the frame a clock must be divided by γ to give the reading on the frame b clock. The resultant 2 microseconds makes it appear to the frame b observer that the speed of light is still equal to c (600 meters divided by 2 microseconds). Thus, the reading on the moving clock, assuming a speed of light equal to c, is the same reading that a stationary clock reads when the apparatus is not moving.

Exactly the same result can be obtained via the Lorentz equation (1) by substituting in the values for t_a and x_a at the time a pulse has completed a round trip.

$$T_b = \gamma\left(T_{am} - \frac{v}{c}\frac{(T_{am} v)}{c}\right) = \frac{\gamma^2 T_a}{\gamma^2} = T_a \tag{16}$$

Thus, in the numerical example, the first term is evaluated by inserting the elapsed-time reading of 2.5 microseconds on the frame a clock and multiplying that by γ, which multiplies the whole equation, to give 3.125 microseconds. The second term is obtained by inserting the x distance in frame a (given by 2.5 microseconds times the velocity of 0.6 the speed of light or 450 meters). This distance is divided by the speed of light to give 1.5 microseconds, which is then multiplied by the 0.6 velocity ratio to give 0.9 microseconds. This 0.9 microseconds is multiplied by the γ, which multiplies the whole equation to give 1.125 microseconds, which when subtracted from the 3.125 microseconds gives the expected 2.0 microseconds.

The longitudinal path

In the longitudinal direction the analysis is a bit more complex, and both the two-way and the one-way readings are analyzed. First, note that the longitudinal length is contracted due to the motion. Thus:

$$L_{am} = \frac{L_a}{\gamma} \tag{17}$$

Numerically, the length which was 300 meters when stationary becomes 240 meters when moving at 0.6 the speed of light. (Since the units of measurements in frame b are also shortened the measured length in frame b will still be 300 meters.)

The outward velocity of the light will be (c - v). This gives an elapsed time for the outward leg of:

$$T_{ao} = \frac{L_a}{\gamma c\left(1 - \frac{v}{c}\right)} \tag{18}$$

This equation gives an elapsed time of 2 microseconds for the outward bound trip as measured by frame a clocks. But, per equation (4), the elapsed time measured by frame b clocks will be shorter:

$$T_{bo} = \frac{T_{ao}}{\gamma} = \frac{L_a}{c}\left(1 + \frac{v}{c}\right) \tag{19}$$

Thus, the outward-bound elapsed time measured by the moving clocks will be 1.6 microseconds.

A simple sign change allows us to immediately repeat the above development for the inbound elapsed time. Thus:

$$T_{bi} = \frac{L_a}{c}\left(1 - \frac{v}{c}\right) \tag{20}$$

This gives an inbound elapsed time of 0.4 microseconds as measured by the moving clocks.

The round-trip time is just the sum of equations (19) and (20) and gives the same 2.0 microseconds, which was obtained for the measured transverse round-trip time.

$$T_b = T_{bo} + T_{bi} = \frac{2L_a}{c} = T_a \tag{21}$$

Rather than attempting to duplicate this result by substituting measured values into the Lorentz equations, it is simpler to show that simply by biasing the clock as a function of the longitudinal position we can get exactly the same result. (The clock bias as a function of position can be directly ascribed to Einstein's assignment of one-half the total transit time equally to the outbound and inbound legs.) From equations (19) and (20) it is clear that a clock bias of:

$$\tau = -\frac{v}{c}\frac{L_a}{c} = -\frac{v}{c}\frac{x_b}{c} \tag{22}$$

will cause the measured time to be equal to one microsecond in each direction and will give the standard velocity of light in each direction. (Note again that the distance measured as x_b is the same as the distance L_a because both the distance and the measuring instruments used to measure the distance were each shortened by the same ratio.) This clock bias is in precise agreement with that derived in equation (12) above.

Sherwin's Experiment

Whenever moving masses are considered, the increase of mass with velocity must be taken into account. Quite often this is not done, and improper results are obtained. Sherwin's experiment is a typical example. Sherwin rotated two balanced masses opposite each other. The masses were attached by springs to the spin center. One of the masses was an accelerometer, which, if the input postulates were correct, would presumably indicate a cyclical variation in the acceleration experienced. The experimental apparatus was ingeniously designed to use the spring coefficient and the expected periodic acceleration to amplify the desired signal. The expected signal was not detected. In the development below, it is shown that no signal can be expected if the increase of mass with velocity is included in the analysis.

Let us describe the experiment as a spinning mass on the end of a length of rod, r, which travels at a velocity, v_s, with respect to its center of motion. For simplicity, we will ignore the counteracting balance. Let the mass spin clockwise and the angle with respect to 12 o'clock be designated by θ. Let the Cartesian coordinate x point in the 3 o'clock direction and the y coordinate point in the 12 o'clock direction. The square of the component of the spin velocity in the x direction is then given by:

$$V_x^2 = v_s^2 \mathrm{Cos}^2\theta \tag{23}$$

And the square of the y component of total velocity by:

$$V_y^2 = v_s^2 \mathrm{Sin}^2\theta \tag{24}$$

Clearly, the mass will increase a small amount due to the spin velocity.

Consider next what happens if we add a translational velocity, v_t, in the x direction without changing the angular momentum of the spinning mass. The x component of the velocity squared becomes:

$$V_x^2 = v_t^2 + 2v_t v_s \mathrm{Cos}\theta + v_s^2 \mathrm{Cos}^2\theta \tag{25}$$

The y component of the velocity squared remains unchanged. Clearly, the mass increase which is caused directly by the spin velocity alone is unchanged (that due to the last term of equation (25) combined with equation (24)).

Spinning mass as a clock

But the mass increase due to the translational velocity, the first term on the right hand side of equation (25), will cause the spinning mass to increase. The new spinning mass will be:

$$m_t = m_s \left(1 - \frac{v_t^2}{c^2}\right)^{-1/2} = \gamma\, m_s \tag{26}$$

But this increased mass must be accompanied by a decrease in the spin velocity in order to preserve the same angular momentum. Thus,

$$v_{s\,m} = \frac{v_s}{\gamma} \tag{27}$$

where the m subscript is used to denote the spin velocity measured after the translational velocity was imparted.

At this point we have already discovered that a spinning mass can act the same as a clock. When it is given a translational velocity, the mass increase resulting from that translational velocity causes the period of the clock to be increased, i.e. the clock runs slower in accord with the Tangherlini equation (4). For later development, the translational velocity itself is measured in terms of the spin rate of the mass (in effect, the moving clock); and, when this slower unit of time measure is used, the apparent translational velocity is increased to:

$$v_{t\,m} = \gamma\, v_t \tag{28}$$

Cyclical variation in speed—clock bias

It is now time to consider the cyclical mass increase induced by the middle term on the left hand side of equation (25). The mass including that due to the cyclical term will become:

$$m_c = m_t \left(1 - \frac{2 v_t v_s \mathrm{Cos}\theta}{c^2}\right)^{-1/2} \tag{29}$$

This cyclical mass variation causes a cyclical variation in the spin velocity in order to maintain a constant angular momentum. Thus, using the low velocity approximation of the square root, the spin velocity becomes:

$$v_{s\,c} = v_s \left(1 - \frac{v_t v_s \mathrm{Cos}\theta}{c^2}\right) \tag{30}$$

The spin velocity, given in equation (30), can be divided into the circumference of the spin radius to give the period of the effectively moving clock:

$$P = \frac{2\pi r}{v_s} \tag{31}$$

Equation (31) remains true even with the cyclical variation, since the integral of the variation is zero over one complete cycle. But the variation shows up when we compute the time integral needed to complete each 1/4 of a cycle. The first and fourth quadrants, due to a slower average velocity, give a longer time period equal to:

$$P_{q1} = P_{q4} = \frac{P}{4}\left(1 + \frac{v_t}{c}\frac{r}{c}\right) \tag{32}$$

The second and third quadrants, due to an increased average velocity, give a shorter time period equal to:

$$P_{q2} = P_{q3} = \frac{P}{4}\left(1 - \frac{v_t}{c}\frac{r}{c}\right) \tag{33}$$

Perhaps even more useful, the time taken for the spinning mass to complete a fraction, f, of a cycle is given by:

$$\tau_c = f\,P\left(1 + \frac{v_t}{c}\frac{r\,\mathrm{Cos}\theta}{c}\right) = f\,P\left(1 + \frac{v_t}{c}\frac{x_b}{c}\right) \tag{34}$$

Equation (34) shows clearly that, if the time bias as a function of longitudinal position in the moving frame is added to the clock per Poincare's principle, equation (12), and illustrated in equation (22), the spinning mass will appear to spin at a constant rate (and will cause the apparent mass to remain constant).

Cyclical variation in speed—flattened orbit

But there is another effect of the variable spin velocity. During the time period P_{q1} the translational motion will cause the center to move farther than it would have otherwise. The extra distance caused by the second term of equation (32) will be:

$$\Delta x = v_t\left(\frac{v_t}{c}\frac{r}{c}\right) = r\left(\frac{v_t^2}{c^2}\right) \tag{35}$$

If the rotational velocity had been at a uniform rate, the spinning mass would be a distance, r, ahead of the center of spin at the end of the first quadrant. But, because of the slower spin rate, the center of spin has moved the extra distance given in equation (35); and the separation distance is only:

$$r_b = r - \Delta x = r\left(1 - \frac{v_t^2}{c^2}\right) = \frac{r}{\gamma^2} \tag{36}$$

But in the development of equation (36), the extra apparent translational velocity caused by the slower average spin rate of the mass around the entire cycle was ignored. This effect, described above in equation (28), causes the actual distance between the spin center and the spinning mass at the end of the first quadrant to become:

$$r_b = \frac{r}{\gamma} \tag{37}$$

This expression shows that the variation in mass which causes a variation in the spin velocity also results in a trajectory with respect to the spin center that is flattened in the translational direction precisely consistent with the amount that the rod, which attaches the mass to the spin center, is shortened. Thus, no variation in acceleration forces will be apparent at the spinning mass due to the longitudinal shortening of the rod. This confirms the null results of Sherwin's experiment. It also argues that, if the increase of mass with velocity is real, Lorentz-Fitzgerald contraction is real.

Additional Observations

Non-detectable distortion

If we could take an instantaneous snapshot (implying infinite light speed) of the spinning mass at precise intervals of one fourth the total period of revolution, we would find that the mass would not have attained 90 degrees rotation at the end of the first interval and would have passed 270 degrees at the end of the third interval. But the use of real light would take just enough differential time to reach the camera so that a real camera would indicate that the spin rate is constant.

Direction of the translational velocity with respect to the spin axis

In the above development, the translational velocity vector was in the plane of the spinning mass, i.e. the spin axis was at a 90 degree angle with respect to the translational velocity vector. If the translational velocity vector is at some other angle, φ, the cyclical variation in the mass is reduced proportional to the cosine of φ, i.e. by the projection of the spin path onto the plane defined by the velocity vector and by the normal to the plane defined by the velocity vector and the spin vector. This reduces the cyclical effect appropriately. However, the mass increase which is caused by the translational velocity alone retains its full effect; and the period of the spin is reduced precisely in accordance with a moving clock, independent of the orientation of the spin axis. Note that Dring [4], in a recent article, used spinning masses with the spin axis at an arbitrary angle to the translational velocity and concluded (using an analysis of torques) that the Lorentz transformation was invalid. However, he also failed to consider the effect of the mass increase with velocity.

Spinning rim

Note what would happen if we put a rim of mass spinning around the center instead of a single mass object. Each portion of the mass in the rim would move at a slower than average spin rate during the 9 o'clock to 3 o'clock portion and at a faster than average spin rate during the 3 o'clock to 9 o'clock portion of the trajectory. This would result in the flattening of the rim in the longitudinal dimension. Thus the spokes would be shortened when they aligned with the translational velocity. At first blush, it might appear that a stress would develop in the rim due to the changing velocity of different portions. However, during the slower rotational portion the rim itself aligns with the translational velocity, is moving faster, and thus has contracted an additional amount. During the faster rotational portion, the rim is aligned opposite the translational velocity, is moving slower, and thus contracts a smaller amount. This variation in length contraction is exactly consistent with the variation of the spin velocity of the individual elements of mass in the rim.

Gravitational potential flattening

It is also worth noting that nothing which we have derived above requires that the accelerating force be an attached rod. If gravitational potential is caused by an excess of ether density around a mass particle (the standing waves within the particle cause an internal reduction in the ether density), the gravitational potential should also be flattened with velocity. This is the only explanation—consistent with a Lorentz ether—for an absence of fluctuations in the apparent circular velocity of a mass orbiting a body which is itself orbiting another mass. But a flattening of the gravitational potential, in turn, has other implications, which should have observational consequences.

Potential flattening and VLBI

VLBI (Very Long Baseline Interferometry), which measures the angles to distant quasars via difference in time arrival of the correlated noise in the radiated energy, according to a 1976 article [5], gives substantially poorer results than expected. The article indicates that an angular accuracy of one milliarc-second should be possible, yet the actual accuracy was generally on the order of 100 times poorer than expected. They themselves report an accuracy at about the 50 millrarc-second level. My computations indicate that the gravitational potential flattening caused by the earth's orbital motion will cause on the order of plus or minus 2 to 3 milliarc-seconds of variation as the earth spin combines with the orbital flattening effect on the station locations to cause an unmodeled variation in the angle of the station separation baseline. Thus, if the systematic effects can truly be reduced to the 1 milliarc-second level, then velocity flattening of the gravitational potential may eventually become detectable.

Potential flattening and interplanetary radar measurements

Again, it is rather old data, but a 1967 article [6] does a rather thorough comparison of general relativity and Newtonian gravitation by incorporating precise radar measurements with optical data to determine the orbits of the inner planets. They compared the post-fit measurement residuals and got a slightly better fit with the general relativity equations. However, both fits indicated a systematic inaccuracy by giving much larger errors than expected when used to predict positions up to six weeks in advance. I believe that the distance between the planets will not only be affected by the two general relativistic effects which the authors considered, i.e. the direct effects on the motions of the planets and the gravitational effects on the propagation of light, but also by the velocity induced flattening of the gravitational potentials. This latter effect, because of the constantly changing velocity vectors, could constitute a sizable effect.

Conclusion

An ether model with associated postulates was developed, which is a modified version of the Lorentz ether model. It was shown that these postulates were consistent with Poincare's principle and with the Lorentz transformation equations. However, the interpretation and application of the Lorentz transformation equations is more limited. This realistic interpretation of the equations was used to analyze the Michelson-Morley experiment and Sherwin's experiment. It was noted that, when moving mass is involved, it is a severe analytical error to ignore the increase of mass with velocity. In Sherwin's experiment the mass increase was shown to: (1) give a spin-rate decrease consistent with the clock-rate decrease of a moving clock; (2) give a variable rate of spin such that the clock bias, associated with the Poincare principle mapping, can cause the spin rate to appear uniform; and, (3) that the same variable spin rate causes an apparent flattening of the orbit of the spinning mass in the longitudinal dimension.

Some additional observations were made which can be used to extend these results; and two suggestions for possible measurement of the velocity flattening effects on gravitational potentials were made.

While some will judge that it has no place in a scientific paper, I must make the comment that I am overwhelmed by evidence for design in the absence of measurable effects of velocity. It is absolutely amazing that (1) slowing of clocks as a function of velocity, (2) longitudinal contraction of distances, and, (3) the increase of mass with velocity *always* combine such that, with the inclusion of a clock bias as a function of the longitudinal position, all effects of velocity are removed—at least in local experiments. (In fact, we have shown that the clock slowing is a result of the other two.) My reaction to this echo's Solomon [7]: "It is the glory of God to conceal a matter; to search out a matter is the glory of kings." In Solomon's time the kings were the scientists—so I do not think it is doing violence to say: "to search out a matter is the glory of scientists." Welcome to the search!

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