On the Special Relativity

May 13, 2015.

José Francisco García Juliá

jfgj1@hotmail.es

Abstract

There are enough unknowns for not considering the special relativity as true.

Key words: special relativity.

1. Introduction.

This year is the 110 anniversary of the special relativity (SR), but this theory is still in controversy. We report several problems in that regard.

2. Mathematical problems.

Let it be

$$A = B \quad (1)$$

$$C = D \quad (2)$$

where A, B, C and D are algebraic expressions. Subtracting (2) from (1)

$$A - C = B - D$$

and moving B to the first member and C to the second one

$$A - B = C - D \quad (3)$$

Doing

$A = c^2(t_2 - t_1)^2$,
$B = (x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2$,
$C = c'^2(t'_2 - t'_1)^2$,
$D = (x'_2 - x'_1)^2 + (y'_2 - y'_1)^2 + (z'_2 - z'_1)^2$,

(where (x_1, y_1, z_1), (x_2, y_2, z_2), (x'_1, y'_1, z'_1) and (x'_2, y'_2, z'_2) are the spatial coordinates of two points in the reference systems S at rest and S' that moves with respect to S with a speed V, respectively, t_1, t_2, t'_1 and t'_2 the times of two events in S and S', and c and c' the celerity in S and S' of a perturbation or signal that propagates between both points during the two events: emission and arrival of the perturbation or signal) it would be

$s^2 = A - B$
$s'^2 = C - D$

where s and s' are the so-called intervals. Then, from (3), $s^2 = s'^2$ and $s = s'$, which is a supposed invariance of the SR.

Note that with these simple relations we have obtained the invariance of the intervals, but without supposing that the relative speed V is constant and that $c' = c$, which is another supposed invariance of the SR. Note also that we have not yet specified the type of perturbation or signal (light or sound, for example) of speeds c and c'. In contrast, in [1] (pp. 5-7), it is affirmed that $s' = s$ because $c' = c$, where c would be the speed of the light in the vacuum, and V is considered always constant. And also, in [1] (p. 13), it is affirmed that in the Galileo's transformation the intervals are not invariants. These same two affirmations are expressed in [2] (pp. 295-296). This is not true because (3) serves also for the Galileo's relativity.

Now, following [1] (pp. 13-15), we obtain the Lorentz's transformation. From a "rotation" of "angle" ψ in the plane xt ($y' = y$, $z' = z$) and supposing that $c' = c$:

$x = x' \cosh \psi + ct' \sinh \psi$
$ct = x' \sinh \psi + ct' \cosh \psi$

For the origin O' of S' ($x' = 0$):

$x = ct' \sinh \psi$
$ct = ct' \cosh \psi$

Then

$V/c = x/ct = \tanh \psi$

because $V = x/t$. And from $\tanh \psi = \sinh \psi / \cosh \psi$ and $\cosh^2 \psi - \sinh^2 \psi = 1$, it would be:

$\sinh \psi = (V/c)/(1 - V^2/c^2)^{1/2}$
$\cosh \psi = 1/(1 - V^2/c^2)^{1/2}$

Then

$$x = \frac{x' + Vt'}{\sqrt{1 - \frac{V^2}{c^2}}}, \; y = y', \; z = z', \; t = \frac{t' + \frac{V}{c^2} x'}{\sqrt{1 - \frac{V^2}{c^2}}} \quad (4)$$

$$x' = \frac{x - Vt}{\sqrt{1 - \frac{V^2}{c^2}}}, \; y' = y, \; z' = z, \; t' = \frac{t - \frac{V}{c^2} x}{\sqrt{1 - \frac{V^2}{c^2}}} \quad (5)$$

which are, respectively, the inverse and normal Lorentz's transformations.

(5) can also be obtained from the relations [3] (pp. 22-24):

$x' = k(x - Vt)$, $x = k(x' + Vt')$, $x' = c't' = ct'$ and $x = ct$, giving $k = (1 - V^2/c^2)^{-1/2}$.

From (5), we see that if $V = c$, x' and t' go to infinite. And if $V > c$, x' and t' are imaginary. This might be logical for the light but not for the sound. Note that for example the Doppler's effect is valid for the light and the sound too.

3. Physical problems.

The inertial systems are the systems that move at constant speed. In the SR, it is affirmed that the speed of the light in the vacuum c is the same, an invariant, in all the inertial systems.

We suppose now that a particle moves at a constant speed V. Then, it might be considered as a possible inertial reference system S'. And in S' the speed of the light in the vacuum is $c' = c$.

But what happens if this particle were a neutrino. The speed of the neutrino is c (see the appendix). Now we suppose that at $t = 0 = t'$, the origins of S and S' coincide ($O = O'$), and in that moment a photon and a neutrino are emitted from the common origin. Then, which would be the speed of the photon in S', c or zero?. And would be x' and t' infinite?.

Also, from (5) [1] (pp. 16-17), $\Delta x = \Delta x'/(1 - V^2/c^2)^{1/2}$, where $\Delta x = x_2 - x_1$ and $\Delta x' = x'_2 - x'_1$, and $\Delta t = \Delta t'/(1 - V^2/c^2)^{1/2}$, where $\Delta t = t_2 - t_1$ and $\Delta t' = t'_2 - t'_1$, which are the so-called length contraction and time dilation (or time dilatation), respectively. But, have the length contraction and the time dilation been really observed?. Can a relative speed V contract the length and dilate the time?.

On the other hand, the momentum and the energy of a particle are [1] (pp. 35-36): $p = mv/(1 - v^2/c^2)^{1/2}$ and $E = mc^2/(1 - v^2/c^2)^{1/2}$, respectively, where m and v are the rest mass and the speed (not necessarily constant) of the particle. And the moving mass would be: $m_v = m/(1 - v^2/c^2)^{1/2}$. Then, for $v = c$; p, E and m_v go to infinite unless $m = 0$. And the same thing happens in the SR with the wave equation for the light in the vacuum [4]. Then, is the rest mass of the neutrino zero?. Can a relative speed v increase the mass?.

Finally, are the length contraction, the time dilation and the mass increasing real or virtual?.

4. Conclusion.

We conclude that there are enough unknowns for not considering the SR as true.

Appendix

The speed of the neutrino would be c, because it has a left handed spin (antiparallel with its momentum) and the spin of the antineutrino is right handed (parallel with its momentum), then if the speed of the neutrino were $V < c$, a photon (with speed c) in the same direction of the neutrino "would see" the back of a neutrino, but when it passes to the neutrino, it "would see" the front of an antineutrino, which is not logical, then $V = c$.

References

[1] L. D. Landau and E. M. Lifshitz, Teoría Clásica de los Campos, Reverté, Barcelona, 1973. Original edition by Nauka, Moscow, 1967.

[2] Wolfgang K. H. Panofsky and Melba Phillips, Classical Electricity and Magnetism, second edition, Addison-Wesley, Reading, Massachusetts, 1962.

[3] Arthur Beiser, Conceptos de Física Moderna, Ediciones del Castillo, Madrid, 1965. Original edition, Concepts of Modern Physics, McGraw-Hill, 1963.

[4] José Francisco García Juliá, The Light Wave Equation and the Special Relativity, viXra: 1411.0553 [Relativity and Cosmology].
http://vixra.org/abs/1411.0553