A Contradiction on Lorentz's Transformation of Time

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ABSTRACT – Considering it is not possible to have infinitesimal clocks and based on the Lorentz's Transformation between (x, y, z, t) and (ξ, η, ζ, τ), it is proved there is a contradiction on Lorentz's Transformation of Time used in the Theory of Special Relativity.

When Einstein started the Theory of Special Relativity (T.S.R.) in 1905, he intended to remove the asymmetries from Marwell's electrodynamics applicable to moving bodies, creating it from two postulates: an electrodynamics of moving bodies, simple and free of contradictions, disentailed of the notion of "luminiferous ether" and based on Marwell's theory for bodies at rest. That can be deduced from the two first paragraphs of the article which has originated the T.S.R., [1].

Although no one can deny the success reached by the T.S.R. and its conformity with several experimental results, it is not free of contradictions, differently of what Einstein had affirmed. That is what we aim at demonstrating with this current work.

Maybe the simplest proof on the existence of a true contradiction in this theory, without taking into consideration another possible paradox, is related to the fact that there is no possibility of clocks to be totally located in a single point (infinitesimal clocks). Once the true clocks have got null dimensions (height, width, length, etc), applying Lorentz's transformations for different points belonging to the interior of a clock in rectilinear and uniform movement, but for the same time value in the stationary system, we could obtain different values at the system in movement, which leads to a contradiction, supposing this clock is working in perfect shape and points the time at the system in movement. In other words, it is not possible that one clock points two or more different schedules in a single moment.

Let's take an example. According to what is known, Lorentz's transformations, in their simplest form,

$$\tau = \beta\,(t - vx/c^2); \qquad (1)$$

$$\xi = \beta\,(x - vt); \qquad (2)$$

$$\eta = y; \qquad (3)$$

$$\zeta = z; \qquad (4)$$

for $\beta = 1/(1–v^2/c^2)^{1/2}$ and *c* the light speed in vacuum, allow the correspondence between the space-time coordinates (*x*, *y*, *z*, *t*) and (ξ, η, ζ, τ) which characterizes any event E within the T.S.R. Let's consider here that S(*x*, *y*, *z*, *t*) and S' (ξ, η, ζ, τ) are tri-orthogonal inertial systems of rectangular coordinates, and S' moves on a constant speed *v* towards S from moment $t=0$ through the axis X of abscissas of S. At the moment $t=0$ the origins of both systems are coincident and $\tau(x=0, t=0) = 0$. The axes of *x* and ξ are coincident and the axes of *y* and *z* are parallel respectively to axes of η and ζ.

Let's suppose Lorentz's transformations (2) to (4) are valid and that a clock Σ working in perfect shape and pointing $\tau = 3$ o'clock (in relation to both systems) is at rest towards system S', moving on constant speed *v* towards S; its hour hand is parallel to the movement direction and contains the points of abscissas *x* and $x' > x$, ordinate *y*, at moment *t*, according to what was measured at the stationary system, corresponding respectively to abscissas ξ and $\xi' = \beta\,(x' – vt)$, ordinate η, according to what was measured on the moving system. When Σ registers the schedule τ, its hour hand will be located at ordinate $\eta = y$ and it will contain points *x* and *x'*, simultaneously, in relation to S, corresponding respectively to ξ and ξ' at S', positions also occupied simultaneously at this system, otherwise, Σ would register another schedule, and its hour hand would take a leaning position towards the movement, instead of $\eta = y$.

Σ measures the time at system S', while *t* is the time measured at S, but according to Lorentz's transformation (1) we have $\tau' \neq \tau$ if τ' corresponds to an abscissa *x'* different of abscissa *x* corresponding to τ, for the same value of time *t* of the stationary system and supposing the movement is towards axis *x*. But, if our clock Σ points $\tau = 3$ o'clock at moment *t* and (1) is the transformation equation between the schedules measured at the systems S and S', it is clear that values τ and τ' should be both identical to the schedule indicated by Σ and measured at both systems, *e.g.*, $\tau = 3$ o'clock, therefore transformation (1) leads us to a contradiction, once, if its validity is considered: it is not possible that a clock points two different schedules ($\tau' \neq \tau$) at the same moment ($\tau = 3$ o'clock), or for a single hour hand position ($\eta = y$), supposing Σ is working in perfect shape.

It has been proved herein only one contradiction, but others can also be proved, for example, the definition of clocks' synchronism used by T.S.R., and even others within this setting.

Even admitting the time dilatation and the contraction of space, facts by the Experimental Physics, I do not believe Lorentz's transformation of time, (1), can be true, given what has been proven here. It cannot depend on positions, and is possibly written as $\tau = t/\alpha$, in order to be in accordance with the time dilatation.

Dedication

I dedicate this work to professors Normando Celso Fernandes, André Koch Torres Assis and César Lattes.

Bibliography

[1] EINSTEIN, A., *Zur Elektrodynamic Bewegter Korper*, Annalen der Physik, 17, 891-921 (1905).