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LOGICAL AND MATHEMATICAL RECONSIDER OF THE LORENTZ TRANSFORMATIONS

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Abstract

By any means proved scientific fact is that nature is set up on the principle of the oppositions. We will demonstrate this with the Lorentz transformations between the inertial systems **K** and **K'** (we accept that the source of light **K'** is moving in relation to **K** with speed **v** on the axes **x'≡x** and replacing $\beta=\sqrt{1-v^2/c^2}$). The appearance of the transformations [$x'=(x\mp v.t)/\beta$; $t'=(t\mp v.x/c^2)/\beta$] suggests that the mathematical operation in brackets is not bringed to the end. The values $v.t=\Delta x$ and $v.x/c^2=(v/c)(x/c)=\Delta t$ are manifestly corrections to the **x** coordinate and time **t**, caused by transposition of the systems and the top speed of light. As a result $(x\mp\Delta x)=x_{cor}$ is the corrected coordinate **x** and $(t\mp\Delta t)=t_{cor}$ is the corrected time **t**. I.e. **x'** и **t'** are not reciprocal of **x** and **t** , but they are reciprocal quantitys of x_{cor} and t_{cor} . Therefore, we can represent the transformations in their lawful form: $x'=x_{cor}/\beta$; $t'=t_{cor}/\beta$ for viewpoint **K'**. Then, without no doubt, the reverse expressions will be these: $x_{cor}=x'.\beta$; $t_{cor}=t'.\beta$ for viewpoint **K**. And so, according to Lorentz transformations, the principle of relativity appears without absolute status (parameters **K'**)=**κ**(parameters **K**). It remains in force only in conditions of the so-called isolated laboratory. Only then, in no way can be established whether **κ** is **β**, or **1/β**.

KEYWORDS: *inertial systems, Lorentz transformations, principle of relativity*

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1. INTRODUCTION

By any means proved and generally recognized scientific fact is that nature is set up on the principle of the oppositions. At the same time Physics is raising the stunning thesis that inertial systems make an exception to this fundamental law of universum. What is the truth?

2. EXPOSITION

As it is well known [1, part II, p. 464], the Lorentz transformations between the inertial systems **K** and **K'** seem so (we accept that the source of light **K'** is moving in relation to **K** with speed **v** on the axes **x'≡x** and replacing $\beta=\sqrt{1-v^2/c^2}$):

$$x'=(x\mp v.t)/\beta \ ; \ t'=(t\mp v.x/c^2)/\beta \quad – \text{ point of view } K' \qquad (1)$$

This generally accepted kind makes an impression with the unwonted segmented form of expressions which appears subject to interpretations too vague and does not give a precise idea of the proportions we are interested in: **x'/x** and **t'/t** .

The extraction of coefficient β in front brackets allows us to explicitly remind that the reverse transition is always a matter of alphabetical mathematical rule: as soon as $\mathbf{x'=(x\mp v.t)/\beta}$; $\mathbf{t'=(t\mp v.x/c^2)/\beta}$ – viewpoint **K'** , it will be in force only:

$$\mathbf{(x\mp v.t)=x'.\beta \;\; ; \;\; (t\mp v.x/c^2)=t'.\beta} \text{ – viewpoint } \mathbf{K} \qquad (2)$$

(as soon as **A=B/C** – viewpoint **A**, it will be in force only **B=A.C** – viewpoint **B)**. Another option is not available. The transformations between the two sides of equations cannot be other, but inverse. The expressions for point of view **K** follows immediately from (1). This transition brings guarantee for absolute veracity because the rules of omnipresent mathematics are not susceptible to falsification or disregarding.

Directly to the question, it appears that the starting equations (1) represent sui generis mixing space and time reports. Physics uncritically adopts this unrepresentative combination for a definitive fact [1, part II, p. 480, 481, 484, 494], producing on this base series of theoretical and terminological noveltys. In reality, things are far more ordinary.

The appearance of the section in brackets suggests that in the case mathematical operation is not bringed to the end. And, intermediate results, we know, are unfit for making conclusions. That is why we orientate to further rationalization of the obtained dependencies.

The discernment in the essence of this operation is a matter of a few simple logical-mathematical reasonings. The values **v.t** and $\mathbf{v.x/c^2}$ are manifestly corrections to the **x** coordinate and time **t**, caused by transposition of the systems centers and the top speed of the light. In this sense, there is no way for the amending fragment and the amended quantity not to be of the same nature (with the same dimension). Any other assumptions will be frivolous. Indeed the addition $\mathbf{v.t=\Delta x}$ has dimension of the **x** coordinate and addition $\mathbf{v.x/c^2=(v/c)(x/c)=\Delta t}$ has dimension of the time **t**.

So, the undeniable fact is that in expressions (1) the **x** coordinate and time **t** undergo a specific revision. As a result, they acquire values $\mathbf{(x\mp v.t)=(x\mp \Delta x)=x_{cor}}$ – corrected coordinate **x** and $\mathbf{(t\mp v.x/c^2)=(t\mp \Delta t)=t_{cor}}$ – corrected time **t**. It is now apparent that the **x'** coordinate and time **t'** are not reciprocal quantitys of **x** and **t**, but they are reciprocal values of $\mathbf{x_{cor}}$ (corrected coordinate **x**) and $\mathbf{t_{cor}}$ (corrected time **t**). Therefore, even here we can represent the transformations in their lawful form:

$$\mathbf{x'=x_{cor}/\beta} \;\; ; \;\; \mathbf{t'=t_{cor}/\beta} \;\; \text{– point of view } \mathbf{K'} \qquad (1a)$$

Then, without no doubt, the reverse expressions will be these:

$$\mathbf{x_{cor}=x'.\beta} \;\; ; \;\; \mathbf{t_{cor}=t'.\beta} \;\; \text{– point of view } \mathbf{K} \qquad (2a)$$

But for the unreservedly resolve of the case we will make one more particularization.

From the attained findings we understand that the **x'** coordinate and time **t'** are structurally incompatible with the **x** coordinate and time **t**, which difference prevents their immediate comparison. Just this circumstance needs concretization. Analysis of treatment indicates that, because of displaced systems on their relative movement, reports in system **K'** remain mono-dimensional ($\mathbf{x'=x'_{mon}}$, $\mathbf{t'=t'_{mon}}$), while reports in system **K** are formed as summary ($\mathbf{x=x_{sum}}$, $\mathbf{t=t_{sum}}$). The accuracy requires Lorentz transformations to reflect this detail as follows:

$$\mathbf{x'_{mon}=(x_{sum}\mp v.t_{sum})/\beta}\ ;\ \ \mathbf{t'_{mon}=(t_{sum}\mp v.x_{sum}/c^2)/\beta}\ \text{– point of view } \mathbf{K'} \qquad (1b)$$

We must now address the issue about members in brackets. In fact, the procedure for this correction is quite trivial. The summary coordinate $\mathbf{x_{sum}}$ consists of mono-dimensional coordinate $\mathbf{x_{mon}}$ (corresponding to $\mathbf{x'_{mon}}$) and the additional distance $\mathbf{v.t_{sum}}$, i.e. $\mathbf{x_{sum}=x_{mon}\pm v.t_{sum}}$, and summary time $\mathbf{t_{sum}}$ consists of mono-dimensional time $\mathbf{t_{mon}}$ (corresponding to $\mathbf{t'_{mon}}$) and extra time $\mathbf{(v/c)(x_{sum}/c)}$, i.e. $\mathbf{t_{sum}=t_{mon}\pm v.x_{sum}/c^2}$. Then for the expressions in brackets we obtain: $\mathbf{(x_{sum}\mp v.t_{sum})=x_{mon}\pm v.t_{sum}\mp v.t_{sum}}$ **,** respectively $\mathbf{(x_{sum}\mp v.t_{sum})=x_{mon}}$, i.e. $\mathbf{x_{cor}=x_{mon}}$ and $\mathbf{(t_{sum}\mp v.x_{sum}/c^2)=t_{mon}\pm v.x_{sum}/c^2\mp v.x_{sum}/c^2}$, respectively $\mathbf{(t_{sum}\mp v.x_{sum}/c^2)=t_{mon}}$, i.e. $\mathbf{t_{cor}=t_{mon}}$.

So the relationship between the two systems yields: $\mathbf{x'_{mon}=x_{mon}/\beta}$; $\mathbf{t'_{mon}=t_{mon}/\beta}$. Next, things are clear because, following the rules of habitual mathematics (and we know no other), simply we cannot be wrong, namely:

$$\mathbf{x'_{mon}=x_{mon}/\beta}\ ;\ \ \mathbf{t'_{mon}=t_{mon}/\beta}\ \text{– this connection seems so from system } \mathbf{K'} \qquad (1c)$$

$$\mathbf{x_{mon}=x'_{mon}.\beta\ ;\ t_{mon}=t'_{mon}.\beta}\ \text{– this connection seems so from system } \mathbf{K} \qquad (2c)$$

$$\mathbf{x_{mon}/x'_{mon}=\beta}\ ;\ \ \mathbf{t_{mon}/t'_{mon}=\beta}\ \text{– this connection seems so as a relation} \qquad (3)$$

$$\mathbf{x'_{mon}/x_{mon}=1/\beta}\ ;\ \mathbf{t'_{mon}/t_{mon}=1/\beta}\ \text{– this connection seems so as a reverse relation} \qquad (4)$$

Juxtapositions (1c), (2c), (3), (4) exhaust the correlations between the two systems. That is to say, the ultimate form of Lawrence’s transformations is:

$$\mathbf{x'_{mon}=x_{mon}/\beta}\ ;\ \ \mathbf{t'_{mon}=t_{mon}/\beta}\ \text{– point of view } \mathbf{K'} \qquad (1c)$$

$$\mathbf{x_{mon}=x'_{mon}.\beta\ ;\ t_{mon}=t'_{mon}.\beta}\ \text{– point of view } \mathbf{K} \qquad (2c)$$

The received combination straight/reverse transition brings out the nature of the transformation between the two systems, unlike the expressions (1)-(2), where this truth is in disguise.

Formulas (1c)-(2c) undoubtedly satisfy the principle of relativity, because they express the relation:

$$\text{(parameters } \mathbf{K'})=\boldsymbol{\kappa}\text{(parameters } \mathbf{K}) \qquad (5)$$

In other words, the form of laws remains the same in both systems. But now it appears that this principle is without absolute status. It remains in force only in conditions of the so-called isolated laboratory. Only then, in no way can be established whether $\boldsymbol{\kappa}$ is $\boldsymbol{\beta}$, or $\mathbf{1/\beta}$. But, if we violate these conditions, the value of $\boldsymbol{\kappa}$ immediately shows up, and hence it becomes clear which of the systems is moving.

For example, in one of the systems, say in **K**, let us measure a control segment $\mathbf{l_0}$ from the **x** axis, then we transfer with the scale in **K'** and from there we re-measure this segment. Then we should receive either the result $\mathbf{l'=l_0/\beta}$, meaning, referring to (1c), that system **K'** is moving, or the result $\mathbf{l'=l_0.\beta}$, meaning, referring to (2c), that system **K** is moving.

In that case we can offer the following improvisation. Systems **K** and **K'** are found in a state of relative quiescence. Their beginnings and axes coincide completely. Now in any imaginable manner we alter the physical characteristics of **K'** to a position to become relevant to its movement with speed **v** relative to **K** . The purpose of this imaginable procedure is to avoid displaced origins of the systems. So clearly, both parameters **K** , and parameters **K'** will be mono-dimensional and directly comparable. Furthermore, we know that the very system **K'** "is moving" and, because of "this movement", only parameters **K'** "undergo changes" (simultaneously, in one direction and in equally degree, because of the condition for the same form of laws). That is, if we make the relevant measurements before and after the imaginable operation we will directly receive the final form (1c)-(2c) of the transformations.

The authenticity of equations (1c)-(2c) can be proved in many ways as from physics itself, and beyond. For example, to the same result is received by correct solving of notorious experiment of Michelson-Morley, but held in two opposite situations:

When we execute the experiment imaginary in the motionless Ether (system **K**), and we observe him from the moving Earth (system **K'**), we derive dependences (1) (point of view **K'** – mirror-image).

When we execute the experiment on the moving Earth (system **K'**), and we observe him from the motionless Ether (system **K**), we derive dependences (2) (the real point of view **K**).

As mentioned, the mathematical rules are direct incarnation of the comprehensive principle of contradistinctions. They derive from it and so we have no alternative. Without contrary two sides in general mathematical operation cannot be organized, respectively, it is not possible to draw up an equation. Take for example the definition: "inertial systems **K** and **K'** are moving against each other at a speed **v**". This text undoubtedly expresses the absolute relativity of the movement since **K** and **K'** are fully equal in rights (weather speed is **v** or **-v** it is irrelevant). But from the data it obviously can not be drawn problem from it. Once, however attach the speed **v** to any of the systems, they automatically become opposite (given). Then the mathematical apparatus immediately triggers, forming juxtaposing equations (the said transformations), which fix the gained real status – in this case system **K'** represents the movement, and system **K** represents quiescence.

3. CONCLUTION

Itself logic is elementary of this problem. According to Galilei in the inertial systems operate the principle of relativity, which is absolute, as is based on absolute identities: $\mathbf{x'_{mon}=x_{mon}}$; $\mathbf{t'_{mon}=t_{mon}}$. Lorentz transformations demonstrate the untenability of these identities. According to them in the inertial systems operate the principle of relativity, but it is not absolute, because it is based on the categorical differences: $\mathbf{x'_{mon}=x_{mon}/\beta}$; $\mathbf{t'_{mon}=t_{mon}/\beta}$, i.e. $\mathbf{x'_{mon}\neq x_{mon}}$; $\mathbf{t'_{mon}\neq t_{mon}}$.

In other words, Galilei "finds the truth" in the identities: $\mathbf{x'_{mon}=x_{mon}}$; $\mathbf{t'_{mon}=t_{mon}}$ and we know why at that time they are immediate and topical. Einstein, however, based on the peak precision, came to the opposite result: $\mathbf{x'_{mon}=x_{mon}/\beta}$; $\mathbf{t'_{mon}=t_{mon}/\beta}$, i.e. $\mathbf{x'_{mon}\neq x_{mon}}$; $\mathbf{t'_{mon}\neq t_{mon}}$. Thus, he refutes the maxim for an absolute relativity of the motion (the opposed results predetermine and an opposed conclusions). Any other position would carry the stigma of ridiculous alogism. [2, стр.345-349]

Reference
[1] Giancoli D. – *Physics, part I and part II*, Moscow 1989.
[2]. Nikolov A. – *To change of ideas in philosophy and physics*, Sofia 1999