The special theory of a relativity: critical remarks

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1. Введение.

To begin with to me some words about history of creation of the special theory of a relativity (STR) would be desirable to tell.

In the end of XIX century between two sections of physics - mechanics and electrodynamics - serious contradictions have arisen.

On the one hand, in the classical mechanics the principle of a relativity Galilee, confirming full equality of systems of readout, moving rather each other rectilinearly and in regular intervals, was used.

And on the other hand, in electrodynamics movement of particles and a field was described in absolute system of the readout which coordinates have been rigidly connected with an ether.

The ether was understood as the environment filling world space and in which there are all physical processes, including electromagnetic fluctuations.

At that time it seemed to physicists that for reduction of classical mechanics in conformity with electrodynamics it is necessary to confirm existence of an ether wind only.

For the purpose of definition of size of an ether wind in 1881, 1886 - 1887

A. Majkelsonom and E. Moli had been made experiments.

But experiments have yielded negative result: the ether wind has not been registered.

As a result electrodynamics with the ether theory, seemed reliably confirmed with experiences, was not coordinated with classical mechanics.

For the purpose of an exit of a current situation the largest physicists of that time had been made the following:

- In 1881 English physicist D. Thomson has assumed that the weight **M** of a body, moving with a speed ***v***, will be more than its weight $\mathbf{M_0}$ at rest, and:

$$M = M_0 / [1 - (v^2 / c^2)]^{1/2} \qquad (1)$$

where: **c** - a velocity of light;

- In 1889 the Irish physicist D. Fitzgerald has offered dependence for the longitudinal size ***l'*** of a body having length ***l*** in a motionless condition concerning an ether, from speed ***v*** movements of a body concerning an ether:

$$l' = l \cdot [1 - (v^2 / c^2)]^{1/2} \qquad (2)$$

- In 1892 the Netherlands physicist H. Lorentz has added D. Fitzgerald's hypothesis with idea of "local" time **t'**, connected with "true" universal time **t** transformation:

$$t' = t - [(x \cdot v) / c^2] \qquad (3)$$

where: ***v*** - speed of movement of a body at passage of a point of space with coordinate **x**;

and later H. Lorentz has altered transformations Galilee for a case of the big speeds:

$$x' = \beta \cdot (x - V \cdot t) \qquad (4)$$

$$x = \beta \cdot (x' - V \cdot t') \qquad (5)$$

$$y' = y \qquad (6)$$

$$z' = z \qquad (7)$$

by introduction a "relativistic" multiplier **β**:

$$\beta = 1 / [1 - (V^2 / c^2)]^{1/2} \qquad (8)$$

and formulas (4) - (7) have received the name - Lorentz's transformations;

- In 1905 A.Einstein, taking from the classical mechanics a principle of equality of all inertial systems of readout (a relativity principle), and from electrodynamics a principle of a constancy of a velocity of light, has established that existential communication between inertial systems of readout represents Lorentz's transformations.

STR exists already more than hundred years, even despite presence of a considerable quantity of its opponents.

One of the reasons of survivability of STR - its simplicity.

So all kinematic part of STR is under construction on four elementary equations - Lorentz's transformations.

And as the basis for STR following initial conditions serve:

- Symmetry of space and time (the space - is homogeneous and it is isotropic, and time – is homogeneous);

- The principle of a relativity asserting that in any inertial systems of readout all physical phenomena under the same conditions proceed equally, i.e. physical laws are independent (invariant) in relation to a choice of inertial system of readout, and the equations expressing these laws, have the identical form in all inertial systems of readout;

- The principle of invariancy of the velocity of light, asserting that a velocity of light in vacuum does not depend on light source movement, i.e. the velocity of light is identical in all directions and in all inertial systems of readout.

The purpose of my article is intention to offer you to look at STR not a sight of the conformist or the opponent at STR, and a sight of the detached onlooker who is not taking anybody a word and trying to lean only against those laws or principles as which it is possible to consider not subject to doubt.

2. STR in a general view

Critical consideration of STR can be begun with a choice of initial conditions.

Symmetry of space and time is a scope of the theory.

I think that the principle of a relativity closely connected with symmetry of space and time, hardly can cause objection.

And here concerning justice of a principle of invariancy of a velocity of light are available for some critics of STR the doubts connected first of all with their disagreement with a technique of carrying out of experiments on registration of a radio wind (A. Majkelsonom and E. Moli, etc.).

Well, if there are doubts and furthermore considering that the valid nature of light while is unknown, can be it is necessary to try to construct STR in a general view without use of a principle of invariancy of a velocity of light.

If in STR as initial conditions to use only symmetry of space and time and a relativity principle existential communication between inertial systems of readout will be written down in the form of Lorentz's transformations (the formula (4) - (7)), only the multiplier **β** which for difference we name proportionality factor **β**, can be defined from dependences:

- For a case if value of proportionality factor **β** lies in a range **β > 1**:

$$\beta = 1 / [1 - (V^2 / c_1^2)]^{1/2} \qquad (9)$$

- For a case if value of proportionality factor **β** lies in a range **0 < β < 1**:

$$\beta = 1 / [1 + (V^2 / c_2^2)]^{1/2} \qquad (10)$$

where: $\mathbf{c_1}$ and $\mathbf{c_2}$ – the valid constants.

It is possible to tell about the specified ranges of proportionality factor **β** the following:

- At values of proportionality factor **β**, lying in a range **β > 1**, there should be such speed $\mathbf{c_1}$ of movements of a point which would be invariant in any inertial system of readout;

- At values of proportionality factor **β**, lying in a range **0 < β < 1**, there can not be a speed of movement of a point, invariant in any inertial systems of readout.

In STR for reception of dependence of weight of a body from its speed laws of conservation of energy and an impulse were used by consideration of the closed mechanical system consisting of two bodies, having collision single and limited in

time absolutely elastic or absolutely plastic collision, in inertial systems of readout during the moments of time before collision (also function of Lagranzha was applied to this purpose also).

I think that at you does not raise the doubts legality of application in inertial systems of readout of the law of the conservation of energy connected with uniformity of time, and the law of preservation of the impulse connected with uniformity of space, the closed mechanical system.

Therefore, using similarly laws of conservation of energy and an impulse, it is possible to receive dependence of weight **M** moving with a speed ***v*** of a body having weight of rest $\mathbf{M_0}$, for a case of consideration of STR in a general view (without use of a principle of invariancy of a velocity of light):

$$M = \gamma \cdot M_o \qquad (11)$$

where the proportionality factor **γ**, as well as proportionality factor **β**, can be defined from dependences:

- For a case if value of proportionality factor **γ** lies in a range $\gamma > 1$:

$$\gamma = 1 / [1 - (v^2 / c_1^2)]^{1/2} \qquad (12)$$

- For a case if value of proportionality factor **γ** lies in a range $0 < \gamma < 1$:

$$\gamma = 1 / [1 + (v^2 / c_2^2)]^{1/2} \qquad (13)$$

For comparison in tables 1 and 2 major importances of weight **M**, impulse **P** and kinetic energy **E** of a body depending on size of its speed ***v*** are resulted:

- For values of proportionality factor **γ**, lying in a range $\gamma > 1$:

Table. 1

Speed ***v***	Weight **M**	Impulse **P**	kinetic energy **E**
$v << c_1$	$\mathbf{M_0}$	$\mathbf{M_0 \cdot v}$	$\mathbf{(M_0 \cdot v^2)/2}$
$v < c_1$	Has the valid value	Has the valid value	Has the valid value
$v = c_1$	∞	∞	∞
$v > c_1$	Has no valid value	Has no valid value	Has no valid value

- For values of proportionality factor **γ**, lying in a range $0 < \gamma < 1$:

Table. 2

Speed v	Weight **M**	Impulse **P**	kinetic energy **E**
$v << c_2$	$\mathbf{M_0}$	$\mathbf{M_0 \cdot v}$	$\mathbf{(M_0 \cdot v^2)/2}$
$v < c_2$	Has the valid value	Has the valid value	Has the valid value
$v = c_2$	$\mathbf{M_0/2^{1/2}}$	$\mathbf{(M_0 \cdot c_2)/2^{1/2}}$	$\mathbf{M_0 \cdot c_2^2 \cdot (1-1/2^{1/2})}$
$v > c_2$	Has the valid value	Has the valid value	Has the valid value
$v = \infty$	Aspires to **zero**	$\mathbf{M_0 \cdot c_2}$	$\mathbf{M_0 \cdot c_2^2}$

Apparently from tables 1 and 2 if not to take in attention A.Majkelsonom and E.Moli's experiments both ranges of possible values of proportionality factor $\gamma > 1$ and $0 < \gamma < 1$ are equivalent since both satisfy to a boundary condition for small speeds.

3. Theoretical check of STR

Before to begin check of STR it is necessary to answer some questions.

The first question: if to inspect justice of STR it is possible to lean against what laws?

I think that first of all, of course, on laws of preservation of an impulse and energy.

As they were already applied at definition of dependence of weight of a body from speed.

Laws of preservation of an impulse and energy assert that the impulse and energy of the closed mechanical system (on which external forces do not operate) do not change eventually, i.e. in any inertial system of readout for any moment of time the vector of an impulse and size of energy of the closed mechanical system are constant (since there is no external influence).

Now other question – what to consider?

For definition of dependence of weight of a body from speed the closed mechanical system of the bodies which interaction had the character single and

limited in time that allowed to choose two events in inertial systems of readout was used: the first events – prior to the beginning of interaction of the bodies, the second event - after the ending of interaction of bodies.

Then for check of STR it is possible to ask a lawful question.

Whether will provide dependence of weight of a body on speed (the formula (11)) performance of laws of preservation of an impulse and energy of the closed system of bodies, at which interaction has constant character on time, in inertial systems of readout?

To establish it, it is possible to consider the elementary example.

Let's admit that there is the closed mechanical system consisting of two bodies 1 and 2, connected among themselves thread 3 and having equal weight at rest.

In inertial system of readout **K**, in which the center of weights of the system consisting of bodies 1 and 2 and thread 3, is motionless, bodies 1 and 2 with a thread 3 rotate with angular speed $\boldsymbol{\omega}$ round the general center of weights.

And the distance from a body 1 or body 2 to the center of weights of the system consisting of bodies 1 and 2 and thread 3, is equal $\boldsymbol{R}$.

I think that you will not have a doubt concerning that for any moment of time **t** in inertial system of readout **K** the impulse and kinetic energy of the system consisting of bodies 1 and 2 and thread 3, are constant.

Absence of change of kinetic energy of the system consisting of bodies 1 and 2 and thread 3, is connected with impossibility of change potential energies at bodies 1 and 2 and threads 3 in inertial system of readout **K**.

Also for consideration we take inertial system of readout **K'**, moving concerning inertial system of readout **K** with some speed **V** in a plane parallel to a plane of rotation of bodies 1 and 2 with thread 3.

The carried out digital calculations show that in inertial system of readout **K'** impulse **P'** and kinetic energy **E'** of the system consisting of bodies 1 and 2 and thread 3, are time functions **t '** that contradicts laws of preservation of an impulse and energy of the closed mechanical system.

And infringement of laws of preservation of an impulse and energy takes place as for a case when values of proportionality factor **β** and **γ** lie in ranges **β > 1** and **γ > 1**, and for a case when values of proportionality factor **β** and **γ** lie in ranges **0 < β < 1** and **0 < γ < 1**.

For descriptive reasons on fig. 1, fig. 2 and fig. 3 schedules representing dependences of absolute size **|P'|** of impulse **P'**, values of a corner **α'** between a direction of a vector of impulse **P'** and axis **O'x'** of system of readout **K'**, of kinetic energy **E'** the mechanical system consisting of bodies 1 and 2 and thread 3, in inertial system of readout **K'** depending on time size **t'** for a case when values of proportionality factor **β** and **γ** lie in ranges **β > 1** and **γ > 1**.

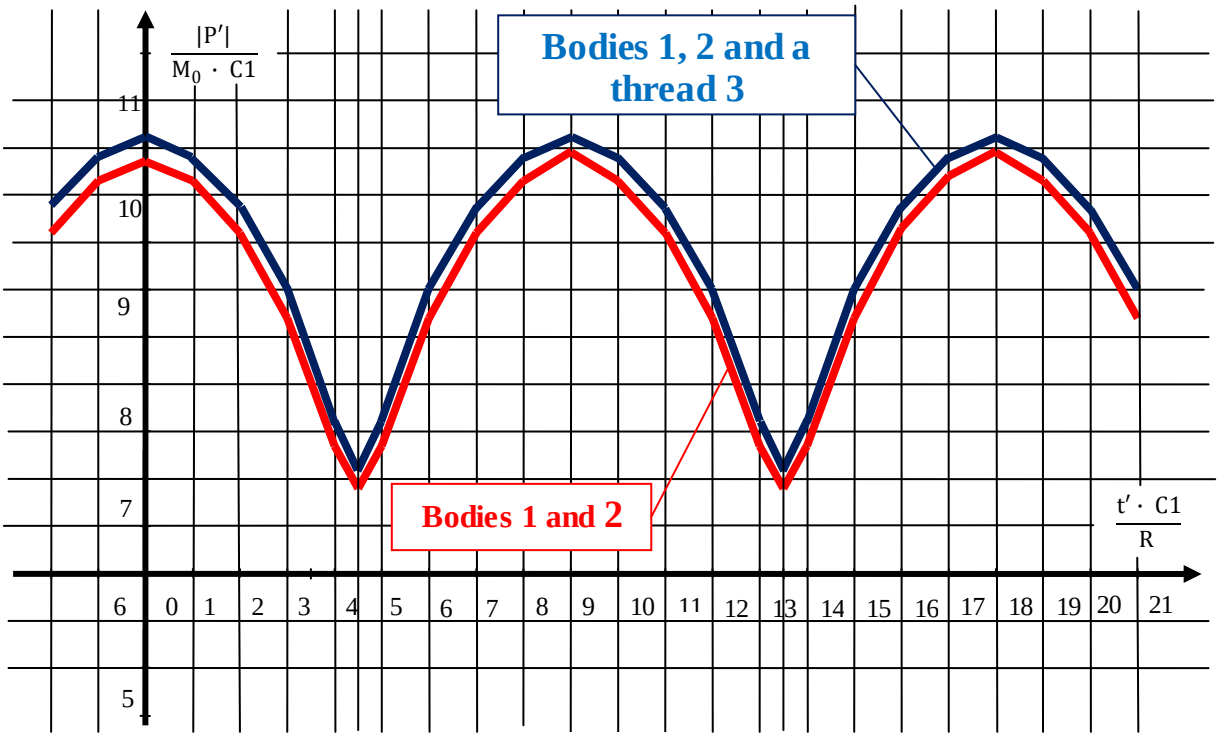

Fig. 1

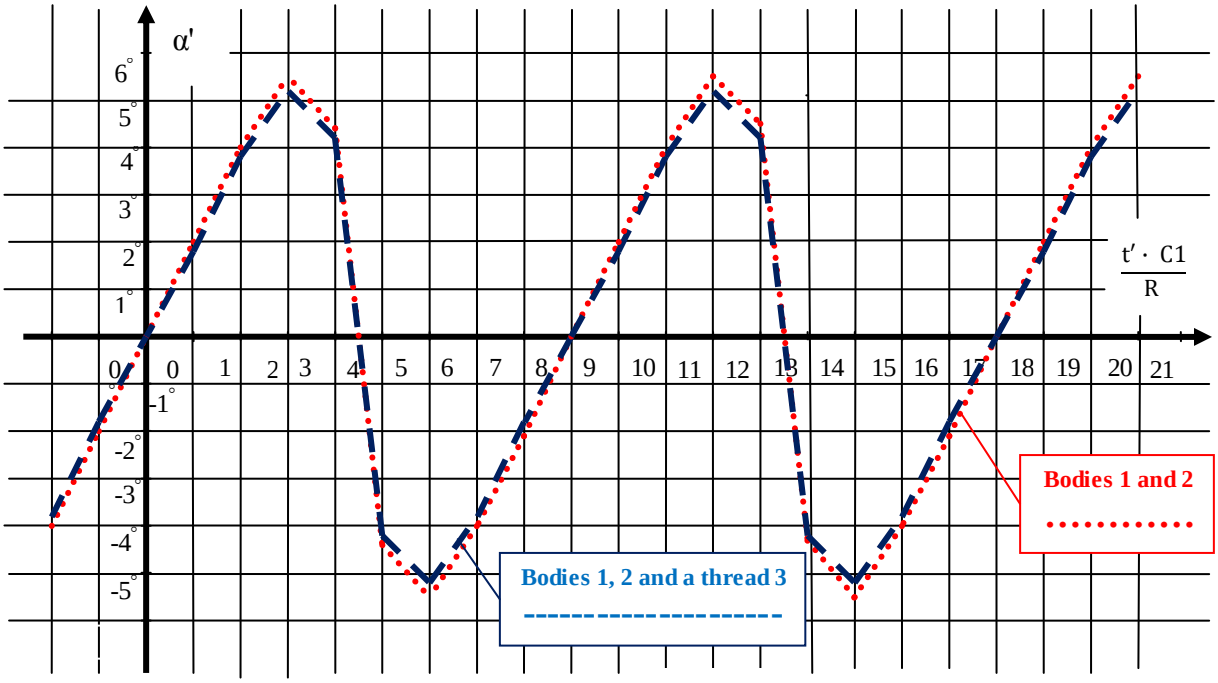

Fig. 2

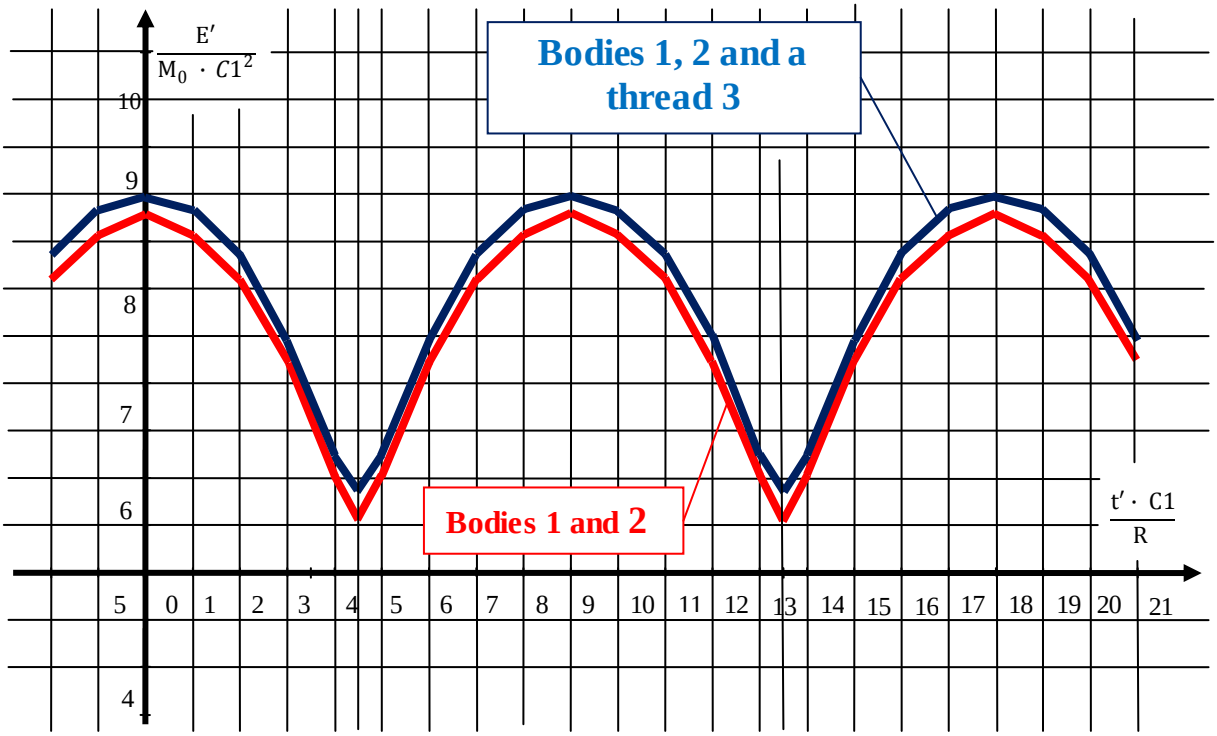

Fig. 3

Moreover, theoretical calculations show that in inertial system of readout **K'** for the closed mechanical system consisting of bodies 1 and 2 and thread 3, laws of preservation of an impulse and energy will be carried out only in a case when constants $\mathbf{c_1}$ and $\mathbf{c_2}$ are equal to infinitely big sizes.

And it leads to that Lorentz's transformations degenerate in transformations

Galilee.

As a result it is possible to notice that use of STR by consideration of separate examples can lead to infringement of laws of preservation of an impulse and energy of the closed mechanical system in inertial systems of readout.

There is only one, namely: to choose, what is true - STR or laws of preservation of an impulse and energy?

I, admit, is more inclined to necessity of performance of laws of preservation of an impulse and energy.