Confirmation of results of the experiments of Michelson without the postulate about the invariance of the speed of light

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This article attempts to show that the results of experiments of Michelson with a sufficiently high degree of accuracy can be explained by the use of dependence of the velocity of movement of the fragment of the purpose of the focused light flux from the angle between the velocity vector of movement of the fragment and the longitudinal axis of the light flux.

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Content

1. Introduction

When assessing the results of the experiments by Michelson A.A. registration of the aether wind[1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14], [15] was used the assumption that in the absolute reference system the light from the source (and the light reflected from the mirror) moves from one point to another by straight line in the form of a beam.

But the beam of light cannot move parallel to itself, that would violate the Fermat's principle [15], [16], [17], [18], [19], [20], [21].

For the implementation of the Fermat's principle fragments of light flux should move in a straight line.

2. Fragments of the light flux. Types of light fluxes

Suppose, as shown in fig. 1, that in a fixed reference system $\mathbf{O_0x_0y_0z_0}$ is stationary relatively luminiferous medium the source **A**, creating narrow-monochromatic light radiation, having the smallest possible constant cross-section.

For the best perception, the light radiation from the source **A** will be called as the light flux type «**0**» (by analogy with the flux of a liquid or the flux of solid particles).

Also assume that the light flux type «**0**» in the longitudinal direction consists of the ***j***-th number of separate fragments, more indivisible without changing the properties of the light flux (fragments of the light flux is depicted in fig. 1 conditionally).

Longitudinal line, goes through the centres of the fragments of the light flux, call the axis of the light flux.

The axis of the light flux type «**0**» is always on the same line.

Front of the light flux type «**0**» is its top cross-section.

All fragments of the light flux type «**0**» are moving forward steadily and unilaterally on the axis of the light flux type «**0**» with constant speed **c**, and hence the light flux type «**0**» itself is moved in a space with a constant speed **c** along a line coincident with its axis (corresponding to Fermat's principle).

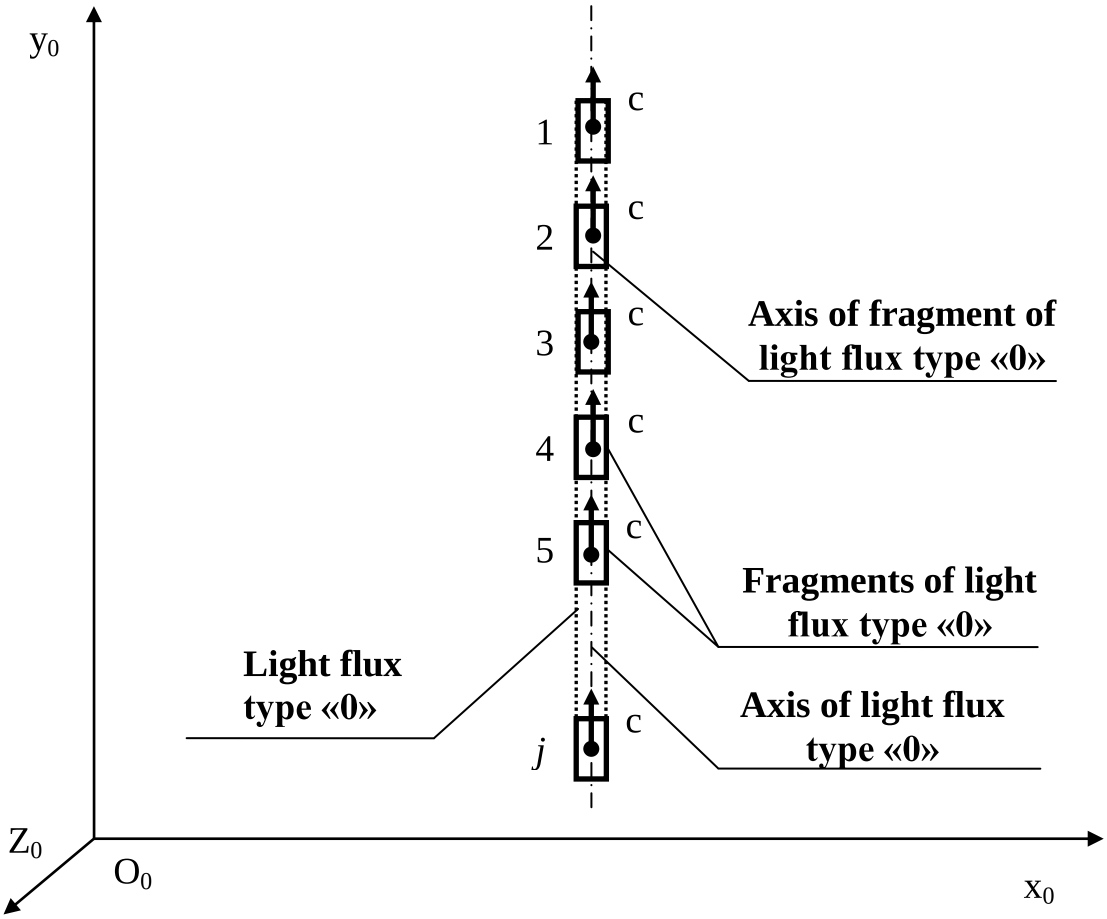


Fig. 1

If on the way of movement of the light flux type «**0**» to put a flat mirror **Z**, motionless in the fixed reference system $\mathbf{O_0x_0y_0z_0}$ and has infinitely greater mass, the light flux type «**0**» reflected from the mirror **Z** and will change into the reflected light flux type «**0**», as shown in fig.2.

The axis of the reflected light flux type «**0**» constantly is on one line and makes an angle **φ** with the axis of the light flux type «**0**».

Front of the reflected light flux type «**0**» is its cross-section.

All fragments of the reflected light flux type «**0**» are moving steadily and unidirectional along axis of the reflected light flux type «**0**» with constant speed **c**, and the reflected light flux type «**0**» itself is moved in a space with a constant speed **c** along a line coincident with its axis (corresponding to Fermat's principle).

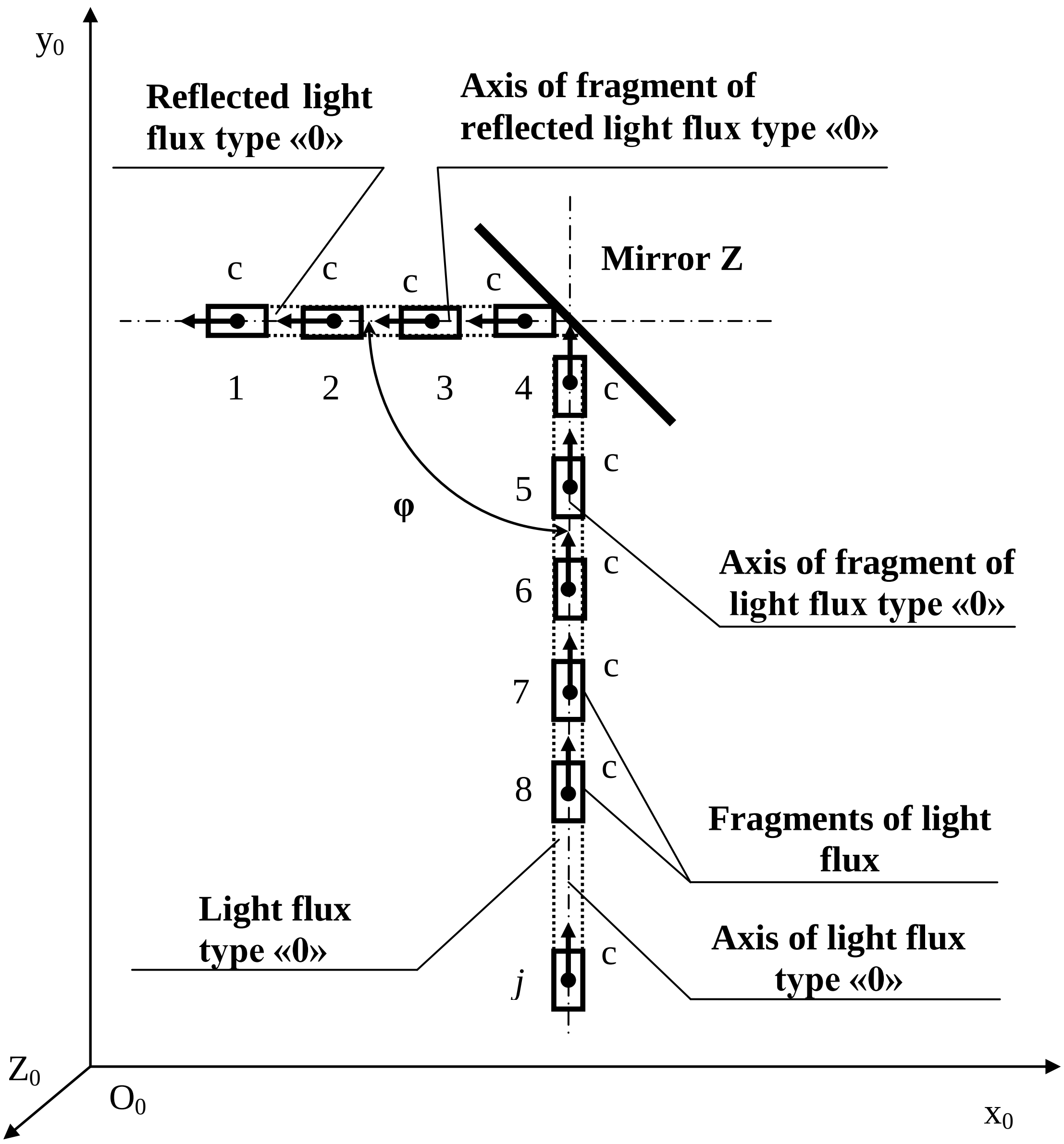


Fig. 2

But if on the way of movement of the light flux type **«0»** will be flat mirror **Z**, which has infinitely greater mass and moves in the fixed reference system $\mathbf{O_0x_0y_0z_0}$ along the axis of the light flux type **«0»** with a velocity **v**, the light flux type **«0»** after reflection from the mirror **Z** will change into the reflected light flux type **«I»**, as shown in fig. 3.

The axis of the reflected light flux type **«I»** is moving in space in parallel to itself with the velocity **v** and constantly makes the angle **φ** with the axis of the light flux type **«0»**.

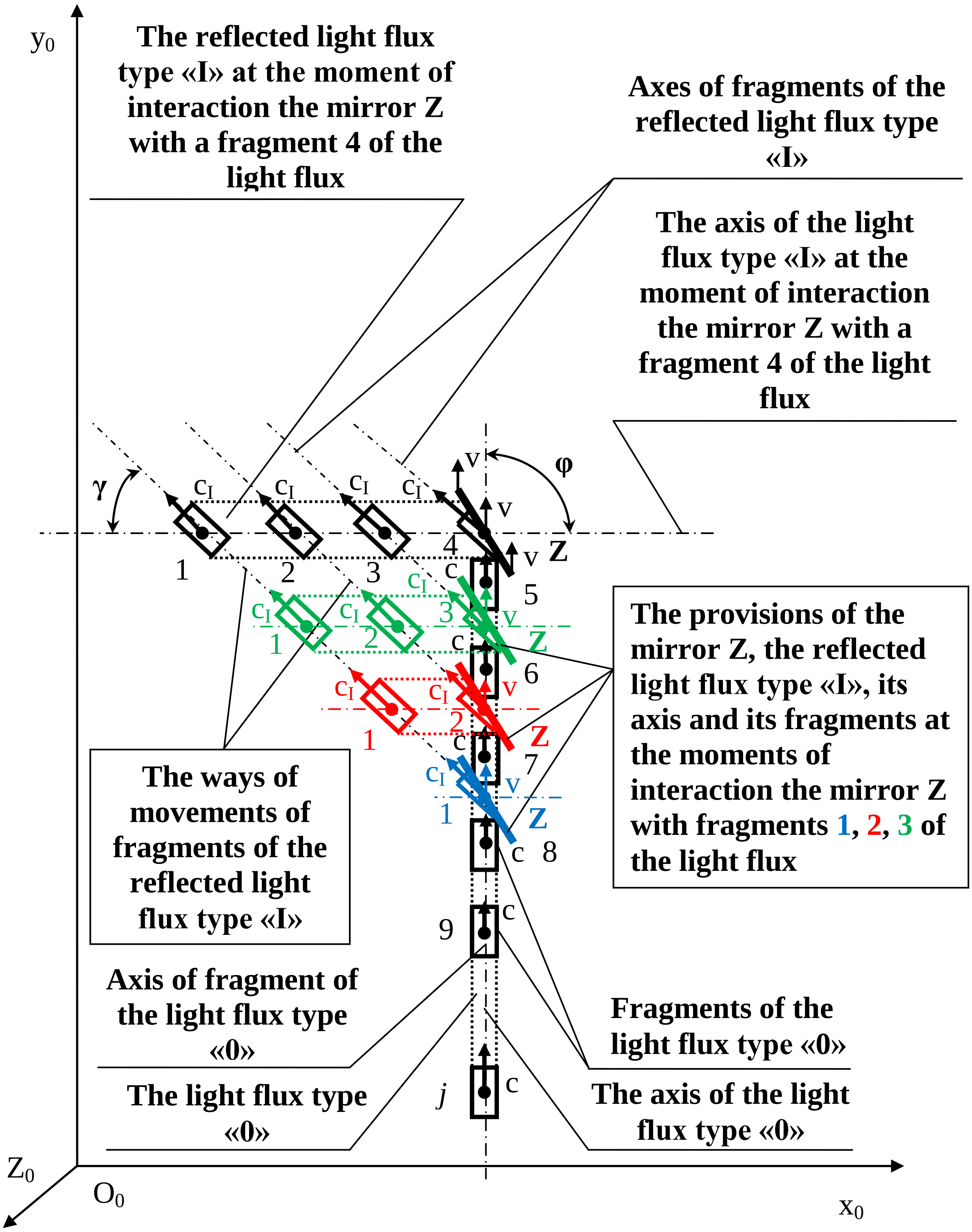


Fig. 3

The reflected light flux type **«I»** moves in space at a constant speed $\mathbf{c_I}$ as progressively from the mirror **Z** along its axis and perpendicular to its axis (inapplicability of Fermat's principle).

Front of the reflected light flux type **«I»** is, as its cross-section and its side surface.

All fragments of the reflected light flux type **«I»** are moving progressively along one's axes with the constant speed $\mathbf{c_I}$ (compliance with the Fermat's principle).

Axes of fragments of the reflected light flux type **«I»** is always at an angle **γ** to the axis of the light flux type **«I»**.

The light flux type **«0»** is a particular case of the light flux type **«I»** at the angle **γ**, equal to 0 ° or 180 °.

3. Dependence of speed of propagation of the light flux type «I» from the angle γ of the tilt of fragments

Assuming the results of the experiments of Michelson (no change in the interference pattern observed in the telescope **D**, within the measurement error) [1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14], [15], for a case when the angle between the direction of the Michelson interferometer and direction of the light flux, emitted by the source **A** and getting on a mirror $\mathbf{Z_2}$ of the interferometer, is equal to zero in the fixed reference system with respect to the luminiferous medium, the dependence of speed $\mathbf{c}_\gamma$ of propagation of the light flux (speed of motion of fragments of the light flux) in the luminiferous medium from the angle **γ** of the deviation of the speed vector $\mathbf{c}_\gamma$ from the longitudinal axis (front) of this light flux may look as follows:

$$c_\gamma = \frac{c}{\sqrt{2} \cdot sin^2\gamma} \cdot \sqrt{1 + sin^2\gamma - \sqrt{1 + 2sin^2\gamma - 3sin^4\gamma}} \qquad (1)$$

where:

c - speed of light in vacuum.

From the formula (1) that the sine of the angle **γ** equals:

$$\sin\gamma = \sqrt{\frac{c^2}{2 \cdot {c_\gamma}^2} - \sqrt{\frac{c^2}{{c_\gamma}^2} - \frac{3 \cdot c^4}{4 \cdot {c_\gamma}^4}}} \qquad (2)$$

4. Derivation of formulas for assessing the results of Michelson's experiments

On Fig. 4 show the positions of structural elements (light source **A** plate **B**, mirrors $\mathbf{Z_1}$ and $\mathbf{Z_2}$, telescope **D**) Michelson interferometer[1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14] and the light fluxes **1**, **2**, **3**, **4**, **5**, **6**, **7** at time $\mathbf{T_0}$, $\mathbf{T_1}$, $\mathbf{T_2}$, $\mathbf{T_3}$, $\mathbf{T_4}$, $\mathbf{T_5}$, $\mathbf{T_6}$, $\mathbf{T_7}$ respectively in the inertial reference system $\mathbf{O_0x_0y_0z_0}$, motionless relatively to the luminiferous medium and in which the Michelson interferometer is moving forward progressively with the velocity **v**.

Moreover, the velocity vector **v** is at an angle $\boldsymbol{\alpha}$ to the line, passing through the centres of the source **A** and mirror $\mathbf{Z_2}$, in the plane of the interferometer.

As shown in fig. 4:

- the moment of time $\mathbf{T_1}$, which depict the position of the light flux **1**, is equal to:

$$T_1 = T_0 + t_1 \qquad (3)$$

where: $\mathbf{t_1}$ - the time interval during which the fragment of the light flux, radiated by a source **A** in moment of time $\mathbf{T_0}$ and moving with a speed $\mathbf{c_1}$, reaches the plate **B**;

- the moment of time $\mathbf{T_2}$, which depict the position of the light flux **2**, is equal to:

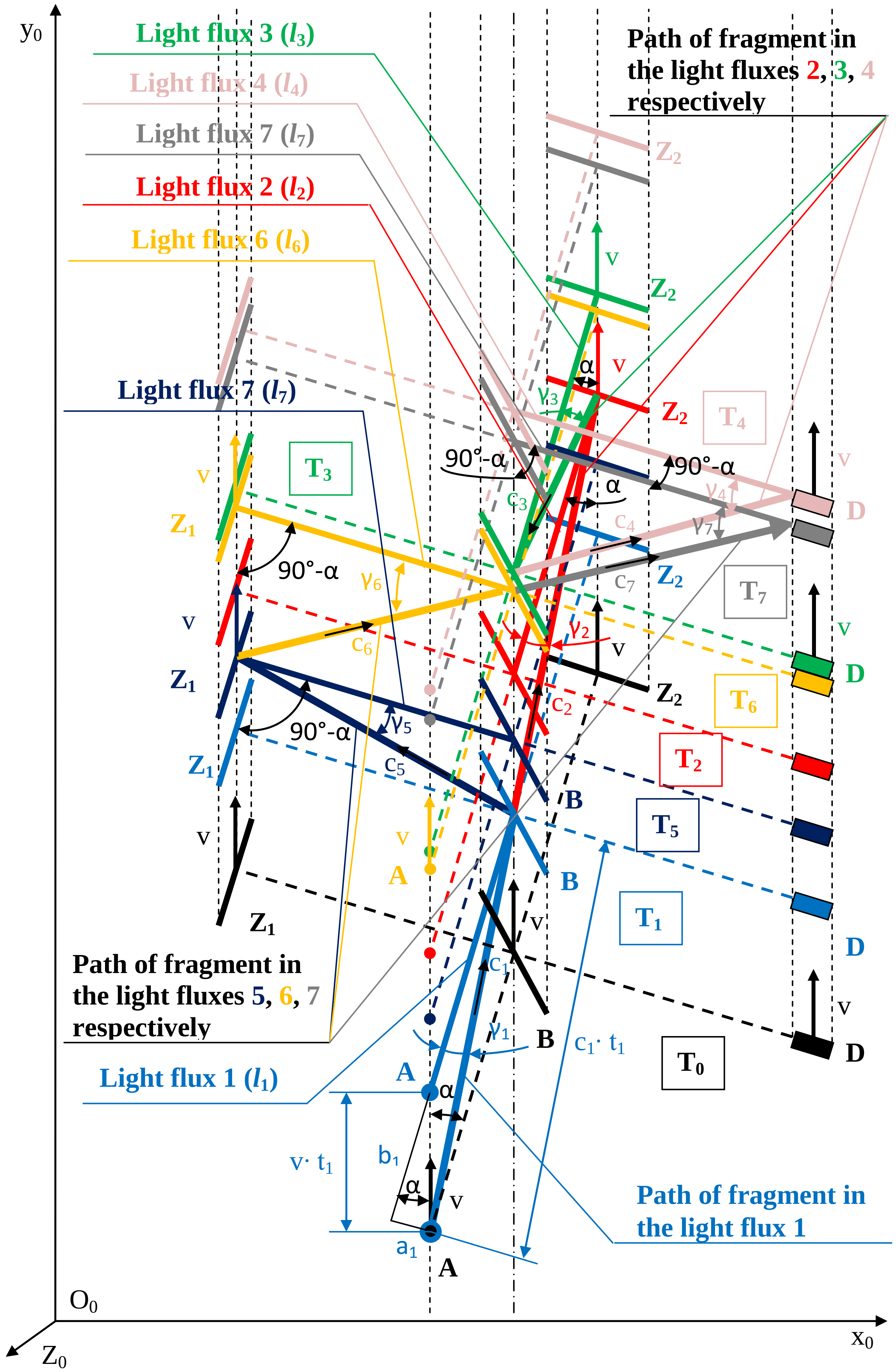
$$T_2 = T_1 + t_2 \qquad (4)$$

where: $\mathbf{t_2}$ - the time interval during which the fragment of the light flux, falling on the plate **B** in moment of time $\mathbf{T_1}$ and moving with the speed $\mathbf{c_2}$, reaches the mirror $\mathbf{Z_2}$;

- the moment of time $\mathbf{T_3}$, which depict the position of the light flux **3**, is equal to:

$$T_3 = T_2 + t_3 \qquad (5)$$

where: $\mathbf{t_3}$ - the time interval during which the fragment of the light flux, falling on the mirror $\mathbf{Z_2}$ in moment of time $\mathbf{T_2}$ and moving with the speed $\mathbf{c_3}$, reaches the plate **B**;



Light flux 3 (l_3)
Light flux 4 (l_4)
Light flux 7 (l_7)
Light flux 2 (l_2)
Light flux 6 (l_6)
Light flux 7 (l_7)
Path of fragment in the light fluxes 2, 3, 4 respectively
Path of fragment in the light fluxes 5, 6, 7 respectively
Light flux 1 (l_1)
Path of fragment in the light flux 1
y_0
x_0
Z_0
O_0
Z_1
Z_2
T_0
T_1
T_2
T_3
T_4
T_5
T_6
T_7
A
B
D
v
α
90°-α
γ_1
γ_2
γ_3
γ_4
γ_5
γ_6
γ_7
c_1
c_2
c_3
c_4
c_5
c_6
c_7
$c_1 \cdot t_1$
$v \cdot t_1$
a_1
b_1

Fig.4

- the moment of time $\mathbf{T_4}$, which depict the position of the light flux **4**, is equal to:

$$T_4 = T_3 + t_4 \quad (6)$$

where: $\mathbf{t_4}$ - the time interval during which the fragment of the light flux, falling on the plate **B** in moment of time $\mathbf{T_3}$ and moving with the speed $\mathbf{c_4}$, reaches the telescope **D**;

- the moment of time $\mathbf{T_5}$, which depict the position of the light flux **5**, is equal to:

$$T_5 = T_1 + t_5 \quad (7)$$

where: $\mathbf{t_5}$ - the time interval during which the fragment of the light flux, falling on the plate **B** in moment of time $\mathbf{T_1}$ and moving with the speed $\mathbf{c_5}$, reaches the mirror $\mathbf{Z_1}$;

- the moment of time $\mathbf{T_6}$, which depict the position of the light flux **6**, is equal to:

$$T_6 = T_5 + t_6 \quad (8)$$

where: $\mathbf{t_6}$ - the time interval during which the fragment of the light flux, falling on the mirror $\mathbf{Z_1}$ in moment of time $\mathbf{T_5}$ and moving with the speed $\mathbf{c_6}$, reaches the plate **B**;

- the moment of time $\mathbf{T_7}$, which depict the position of the light flux **7**, is equal to:

$$T_7 = T_6 + t_7 \quad (9)$$

where: $\mathbf{t_7}$ - the time interval during which the fragment of the light flux, falling on the plate **B** in moment of time $\mathbf{T_6}$ and moving with the speed $\mathbf{c_7}$, reaches the telescope **D**.

We assume that in the Michelson interferometer:

- the distance from the source **A** to the plate **B** is $\boldsymbol{l_1}$,

- the distance from the plate **B** to the mirror $\mathbf{Z_2}$ is $\boldsymbol{l_2}$,

- the distance from the plate **B** to the mirror $\mathbf{Z_1}$ is $\boldsymbol{l_3}$,

- the distance from the plate **B** to the telescope **D** is $\boldsymbol{l_4}$.

Axes of the fragments of the light flux **1** are constantly at an angle $\boldsymbol{\gamma_1}$ to the axis of the light flux **1**.

Axes of the fragments of the light flux **2** are constantly at an angle γ_2 to the axis of the light flux **2**.

Axes of the fragments of the light flux **3** are constantly at an angle γ_3 to the axis of the light flux **3**.

Axes of the fragments of the light flux **4** are constantly at an angle γ_4 to the axis of the light flux **4**.

Axes of the fragments of the light flux **5** are constantly at an angle γ_5 to the axis of the light flux **5**.

Axes of the fragments of the light flux **6** are constantly at an angle γ_6 to the axis of the light flux **6**.

Axes of the fragments of the light flux **7** are constantly at an angle γ_7 to the axis of the light flux **7**.

Using fig.4, when considering the position of the light flux **1** at the moment of time $\mathbf{T_1}$ can be noted the following:

- the distance $\mathbf{a_1}$ and $\mathbf{b_1}$ are equal:

$$\mathrm{a}_1 = \mathrm{v} \cdot \mathrm{t}_1 \cdot \mathrm{Sin}\alpha \tag{10}$$

$$\mathrm{b}_1 = \mathrm{v} \cdot \mathrm{t}_1 \cdot \mathrm{Cos}\alpha \tag{11}$$

- the angle $\boldsymbol{\gamma_1}$ is equal:

$$\gamma_1 = Arcsin\left(\frac{\mathrm{a}_1}{\mathrm{c}_1 \cdot \mathrm{t}_1}\right) \tag{12}$$

path $(\mathbf{c_1 \cdot t_1})$, traversed fragment of the light flux **1**, radiated by the source **A** in moment of time $\mathbf{T_0}$, before reaching the plate **B** in moment of time $\mathbf{T_1}$, can be estimated by the following formula:

$$c_1^2 \cdot t_1^2 = \mathrm{a}_1^2 + (l_1 + \mathrm{b}_1)^2 \tag{13}$$

From the formulas (12) and (10) we can find that:

$$\mathrm{Sin}\gamma_1 = \frac{\mathrm{v} \cdot \mathrm{Sin}\alpha}{\mathrm{c}_1} = \frac{({}^{\mathrm{v}}/_{c}) \cdot \mathrm{Sin}\alpha}{\left({}^{\mathrm{c}_1}/_{c}\right)} \tag{14}$$

With the aid of formulas (2) and (14) can determine the value of the speed

c_1:

$$c_1 = c \cdot \sqrt{\frac{v^4 \cdot Sin^4\alpha}{c^4} - \frac{v^2 \cdot Sin^2\alpha}{c^2} + 1} \qquad (15)$$

And from formula (13) with regard to the equation (14) and boundary conditions can determine the value of the time interval **t_1**:

$$t_1 = \left({}^{l_1}/_{c}\right) \cdot \frac{[({}^{v}/_{c}) \cdot Cos\alpha] + \left[\left({}^{c_1}/_{c}\right) \cdot Cos\gamma_1\right]}{\left({}^{c_1}/_{c}\right)^2 - ({}^{v}/_{c})^2} \qquad (16)$$

By analogy, using fig.4, the following can be noted:

- in the consideration of the position of the light flux **2** in moment of time **T_2**:

$$Sin\gamma_2 = \frac{v \cdot Sin\alpha}{c_2} = \frac{({}^{v}/_{c}) \cdot Sin\alpha}{\left({}^{c_2}/_{c}\right)} \qquad (17)$$

$$c_2 = c \cdot \sqrt{\frac{v^4 \cdot Sin^4\alpha}{c^4} - \frac{v^2 \cdot Sin^2\alpha}{c^2} + 1} \qquad (18)$$

$$t_2 = \left({}^{l_2}/_{c}\right) \cdot \frac{[({}^{v}/_{c}) \cdot Cos\alpha] + \left[\left({}^{c_2}/_{c}\right) \cdot Cos\gamma_2\right]}{\left({}^{c_2}/_{c}\right)^2 - ({}^{v}/_{c})^2} \qquad (19)$$

- in the consideration of the position of the light flux **3** in moment of time **T_3**:

$$Sin\gamma_3 = \frac{v \cdot Sin\alpha}{c_3} = \frac{({}^{v}/_{c}) \cdot Sin\alpha}{\left({}^{c_3}/_{c}\right)} \qquad (20)$$

$$c_3 = c \cdot \sqrt{\frac{v^4 \cdot \mathrm{Sin}^4\alpha}{c^4} - \frac{v^2 \cdot \mathrm{Sin}^2\alpha}{c^2} + 1} \qquad (21)$$

$$t_3 = \left(l_2/_c\right) \cdot \frac{\left[\left(c_3/_c\right) \cdot Cos\gamma_3\right] - \left[(v/_c) \cdot Cos\alpha\right]}{\left(c_3/_c\right)^2 - (v/_c)^2} \qquad (22)$$

- in the consideration of the position of the light flux **4** in moment of time **T_4**:

$$\mathrm{Sin}\gamma_4 = \frac{v \cdot \mathrm{Cos}\alpha}{c_4} = \frac{(v/_c) \cdot \mathrm{Cos}\alpha}{\left(c_4/_c\right)} \qquad (23)$$

$$c_4 = c \cdot \sqrt{\frac{v^4 \cdot \mathrm{Cos}^4\alpha}{c^4} - \frac{v^2 \cdot \mathrm{Cos}^2\alpha}{c^2} + 1} \qquad (24)$$

$$t_4 = \left(l_4/_c\right) \cdot \frac{\left[\left(c_4/_c\right) \cdot \mathrm{Sin}\gamma_4\right] - \left[(v/_c) \cdot \mathrm{Sin}\alpha\right]}{\left(c_4/_c\right)^2 - (v/_c)^2} \qquad (25)$$

- in the consideration of the position of the light flux **5** in moment of time **T_5**:

$$\mathrm{Sin}\gamma_5 = \frac{v \cdot \mathrm{Cos}\alpha}{c_5} = \frac{(v/_c) \cdot \mathrm{Cos}\alpha}{\left(c_5/_c\right)} \qquad (26)$$

$$c_5 = c \cdot \sqrt{\frac{v^4 \cdot \mathrm{Cos}^4\alpha}{c^4} - \frac{v^2 \cdot \mathrm{Cos}^2\alpha}{c^2} + 1} \qquad (27)$$

$$t_5 = \left(l_3/_c\right) \cdot \frac{\left[(v/_c) \cdot \mathrm{Sin}\alpha\right] + \left[\left(c_5/_c\right) \cdot \mathrm{Sin}\gamma_5\right]}{\left(c_5/_c\right)^2 - (v/_c)^2} \qquad (28)$$

- in the consideration of the position of the light flux **6** in moment of time **T_6**:

$$\mathrm{Sin}\gamma_6 = \frac{v \cdot \mathrm{Cos}\alpha}{c_6} = \frac{(v/c) \cdot \mathrm{Cos}\alpha}{\left(c_6/c\right)} \qquad (29)$$

$$c_6 = c \cdot \sqrt{\frac{v^4 \cdot \mathrm{Cos}^4\alpha}{c^4} - \frac{v^2 \cdot \mathrm{Cos}^2\alpha}{c^2} + 1} \qquad (30)$$

$$t_6 = \left(l_3/c\right) \cdot \frac{\left[\left(c_6/c\right) \cdot \mathrm{Sin}\gamma_6\right] - \left[(v/c) \cdot \mathrm{Sin}\alpha\right]}{\left(c_6/c\right)^2 - (v/c)^2} \qquad (31)$$

- in the consideration of the position of the light flux **7** in moment of time **T_7**:

$$\mathrm{Sin}\gamma_7 = \frac{v \cdot \mathrm{Cos}\alpha}{c_7} = \frac{(v/c) \cdot \mathrm{Cos}\alpha}{\left(c_7/c\right)} \qquad (32)$$

$$c_7 = c \cdot \sqrt{\frac{v^4 \cdot \mathrm{Cos}^4\alpha}{c^4} - \frac{v^2 \cdot \mathrm{Cos}^2\alpha}{c^2} + 1} \qquad (33)$$

$$t_7 = \left(l_4/c\right) \cdot \frac{\left[\left(c_7/c\right) \cdot \mathrm{Sin}\gamma_7\right] - \left[(v/c) \cdot \mathrm{Sin}\alpha\right]}{\left(c_7/c\right)^2 - (v/c)^2} \qquad (34)$$

Fragment of the light flux, reflected from the mirror **Z_2**, will make its way from the source **A** to the telescope **D** during the time interval **t_{1234}** equal to:

$$t_{1234} = t_1 + t_2 + t_3 + t_4 \qquad (35)$$

Fragment of the light flux, reflected from the mirror **Z_1**, will make its way from the source **A** to the telescope **D** during the time interval **t_{1567}** equal to:

$$t_{1567} = t_1 + t_5 + t_6 + t_7 \qquad (36)$$

We call delay time **Δt** following difference:

$$\Delta\mathbf{t} = t_{1234} - t_{1567} \qquad (37)$$

In the case when:

$$l_1 = l_2 = l_3 = l_4 = l \qquad (38)$$

the delay time $\Delta\mathbf{t}$ takes the form:

$$\Delta\mathbf{t} = (t_2 + t_3) - (t_5 + t_6) \qquad (39)$$

5. Numerical evaluation of the results of Michelson's experiments

In disposed below Table 1 shows the results of numerical calculations of the values of the ratios $\mathbf{c_2/c}$, $\mathbf{c_3/c}$, $\mathbf{c_5/c}$, $\mathbf{c_6/c}$, $\mathbf{t_2/(\mathit{l}/c)}$, $\mathbf{t_3/(\mathit{l}/c)}$, $\mathbf{t_5/(\mathit{l}/c)}$, $\mathbf{t_6/(\mathit{l}/c)}$, $\mathbf{(t_2+t_3)/(\mathit{l}/c)}$, $\mathbf{(t_5+t_6)/(\mathit{l}/c)}$, $\mathbf{\Delta t/(\mathit{l}/c)}$, angles γ_2, γ_3, γ_5, γ_6 and non-simultaneity $\mathbf{((\Delta t/(t_2+t_3))\cdot 100)}$ of the arrival of the light fluxes in the telescope **D** for various values **v/c**, **α** and when the execution of the condition (38).

Table 1

V/c	α (градус)	$t_2/(L/c)$	$t_3/(L/c)$	$t_5/(L/c)$	$t_6/(L/c)$	$(t_2+t_3)/(L/c)$	$(t_5+t_6)/(L/c)$	Δt/(L/c)	(Δt/(t2+t3))%
0.01	0	1.010101	0.990099	1.0001	1.0001	2.0002	2.0002	0	0
0.01	1	1.010099	0.990101	1.000275	0.999925	2.0002	2.0002	0	0
0.01	10	1.009949	0.990251	1.001837	0.998363	2.0002	2.0002	-5.6E-14	-2.8E-12
0.01	20	1.009498	0.990702	1.003521	0.996679	2.0002	2.0002	-1.6E-13	-7.9E-12
0.01	30	1.008761	0.991439	1.005101	0.995099	2.0002	2.0002	-1.9E-13	-9.4E-12
0.01	40	1.007762	0.992438	1.006529	0.993671	2.0002	2.0002	-8.4E-14	-4.2E-12
0.01	45	1.007172	0.993028	1.007172	0.993028	2.0002	2.0002	0	0
0.01	50	1.006529	0.993671	1.007762	0.992438	2.0002	2.0002	8.39E-14	4.2E-12
0.01	60	1.005101	0.995099	1.008761	0.991439	2.0002	2.0002	1.87E-13	9.37E-12
0.01	70	1.003521	0.996679	1.009498	0.990702	2.0002	2.0002	1.58E-13	7.9E-12
0.01	80	1.001837	0.998363	1.009949	0.990251	2.0002	2.0002	5.55E-14	2.78E-12
0.01	89	1.000275	0.999925	1.010099	0.990101	2.0002	2.0002	0	0
0.01	90	1.0001	1.0001	1.010101	0.990099	2.0002	2.0002	0	0

V/c	α (градус)	$t_2/(L/c)$	$t_3/(L/c)$	$t_5/(L/c)$	$t_6/(L/c)$	$(t_2+t_3)/(L/c)$	$(t_5+t_6)/(L/c)$	$\Delta t/(L/c)$	(Δt/(t2+t3))%
0.1	0	1.111111	0.90909	1.010101	1.010101	2.020202	2.020202	0	0
0.1	1	1.111096	0.90911	1.011882	1.00832	2.020202	2.020202	-6.27E-10	-3.1E-08
0.1	10	1.10961	0.9106	1.027816	0.992392	2.020208	2.020208	-5.66E-08	-2.8E-06
0.1	20	1.105142	0.91508	1.044967	0.975256	2.020223	2.020223	-1.63E-07	-8.1E-06
0.1	30	1.097818	0.92242	1.061008	0.959233	2.02024	2.020241	-1.93E-07	-9.6E-06
0.1	40	1.087827	0.93242	1.075439	0.944813	2.020252	2.020252	-8.68E-08	-4.3E-06
0.1	45	1.081912	0.93834	1.081912	0.938341	2.020253	2.020253	0	0
0.1	50	1.075439	0.94481	1.087827	0.932425	2.020252	2.020252	8.679E-08	4.3E-06
0.1	60	1.061008	0.95923	1.097818	0.922422	2.020241	2.02024	1.932E-07	9.57E-06
0.1	70	1.044967	0.97526	1.105142	0.915081	2.020223	2.020223	1.631E-07	8.07E-06
0.1	80	1.027816	0.99239	1.10961	0.910598	2.020208	2.020208	5.664E-08	2.8E-06
0.1	89	1.011882	1.00832	1.111096	0.909106	2.020202	2.020202	6.272E-10	3.1E-08
0.1	90	1.010101	1.0101	1.111111	0.909091	2.020202	2.020202	0	0

V/c	α (градус)	$t_2/(L/c)$	$t_3/(L/c)$	$t_5/(L/c)$	$t_6/(L/c)$	$(t_2+t_3)/(L/c)$	$(t_5+t_6)/(L/c)$	$\Delta t/(L/c)$	(Δt/(t2+t3))%
0,2	0	1,25	0,833333	1,041667	1,041667	2,083333	2,083333	0	0
0,2	1	1,249971	0,833363	1,045455	1,03788	2,083334	2,083334	-4,4E-08	-2,1E-06
0,2	10	1,247144	0,836291	1,079358	1,004081	2,083435	2,083439	-4E-06	-0,00019
0,2	20	1,238571	0,845123	1,115729	0,967976	2,083694	2,083705	-1,1E-05	-0,00055
0,2	30	1,224298	0,859694	1,149425	0,934579	2,083991	2,084005	-1,4E-05	-0,00065
0,2	40	1,204436	0,879754	1,179288	0,904908	2,08419	2,084196	-6,1E-06	-0,00029
0,2	45	1,192494	0,891725	1,192494	0,891725	2,084219	2,084219	0	0
0,2	50	1,179288	0,904908	1,204436	0,879754	2,084196	2,08419	6,1E-06	0,000292
0,2	60	1,149425	0,934579	1,224298	0,859694	2,084005	2,083991	1,4E-05	0,000651
0,2	70	1,115729	0,967976	1,238571	0,845123	2,083705	2,083694	1,1E-05	0,00055
0,2	80	1,079358	1,004081	1,247144	0,836291	2,083439	2,083435	4E-06	0,000191
0,2	89	1,045455	1,03788	1,249971	0,833363	2,083334	2,083334	4,4E-08	2,11E-06
0,2	90	1,041667	1,041667	1,25	0,833333	2,083333	2,083333	0	0

V/c	α (градус)	$t_2/(L/c)$	$t_3/(L/c)$	$t_5/(L/c)$	$t_6/(L/c)$	$(t_2+t_3)/(L/c)$	$(t_5+t_6)/(L/c)$	Δt/(L/c)	(Δt/(t2+t3))%
0,3	0	1,428571	0,769231	1,098901	1,098901	2,197802	2,197802	0	2,02E-14
0,3	1	1,428534	0,769274	1,105227	1,092582	2,197808	2,197809	-5,9E-07	-2,7E-05
0,3	10	1,424818	0,773558	1,161954	1,036475	2,198376	2,198429	-5,3E-05	-0,00242
0,3	20	1,413299	0,786547	1,222611	0,977389	2,199846	2,2	-0,00015	-0,00697
0,3	30	1,393355	0,808206	1,277955	0,923788	2,201561	2,201743	-0,00018	-0,00825
0,3	40	1,364255	0,838485	1,325645	0,877176	2,20274	2,202821	-8,2E-05	-0,00371
0,3	45	1,346134	0,856801	1,346134	0,856801	2,202935	2,202935	0	0
0,3	50	1,325645	0,877176	1,364255	0,838485	2,202821	2,20274	8,17E-05	0,003707
0,3	60	1,277955	0,923788	1,393355	0,808206	2,201743	2,201561	0,000182	0,008254
0,3	70	1,222611	0,977389	1,413299	0,786547	2,2	2,199846	0,000153	0,006966
0,3	80	1,161954	1,036475	1,424818	0,773558	2,198429	2,198376	5,32E-05	0,002419
0,3	89	1,105227	1,092582	1,428534	0,769274	2,197809	2,197808	5,89E-07	2,68E-05
0,3	90	1,098901	1,098901	1,428571	0,769231	2,197802	2,197802	0	-2E-14

V/c	α (градус)	$t_2/(L/c)$	$t_3/(L/c)$	$t_5/(L/c)$	$t_6/(L/c)$	$(t_2+t_3)/(L/c)$	$(t_5+t_6)/(L/c)$	Δt/(L/c)	(Δt/(t2+t3))%
0,4	0	1,666667	0,714286	1,190476	1,190476	2,380952	2,380952	0	-1,9E-14
0,4	1	1,666633	0,714342	1,200383	1,180596	2,380974	2,380979	-4E-06	-0,00018
0,4	10	1,663195	0,719891	1,289715	1,093752	2,383087	2,383467	-0,0004	-0,01595
0,4	20	1,651783	0,736832	1,385217	1,004496	2,388615	2,389713	-0,0011	-0,04594
0,4	30	1,629753	0,765456	1,470588	0,925926	2,39521	2,396514	-0,0013	-0,05444
0,4	40	1,593691	0,80625	1,540848	0,85968	2,399942	2,400529	-0,0006	-0,02445
0,4	45	1,569471	0,831364	1,569471	0,831364	2,400835	2,400835	0	1,85E-14
0,4	50	1,540848	0,85968	1,593691	0,80625	2,400529	2,399942	0,00059	0,024461
0,4	60	1,470588	0,925926	1,629753	0,765456	2,396514	2,39521	0,0013	0,054466
0,4	70	1,385217	1,004496	1,651783	0,736832	2,389713	2,388615	0,0011	0,045958
0,4	80	1,289715	1,093752	1,663195	0,719891	2,383467	2,383087	0,00038	0,015955
0,4	89	1,200383	1,180596	1,666633	0,714342	2,380979	2,380974	4,2E-06	0,000177
0,4	90	1,190476	1,190476	1,666667	0,714286	2,380952	2,380952	0	1,87E-14

V/c	α (градус)	$t_2/(L/c)$	$t_3/(L/c)$	$t_5/(L/c)$	$t_6/(L/c)$	$(t_2+t_3)/(L/c)$	$(t_5+t_6)/(L/c)$	$\Delta t/(L/c)$	(Δt/(t2+t3))%
0,5	0	2	0,666667	1,333333	1,333333	2,666667	2,666667	0	-3,3E-14
0,5	1	2	0,666734	1,348891	1,317866	2,666734	2,666757	-2E-05	-0,00085
0,5	10	1,999769	0,673462	1,490948	1,184325	2,673231	2,675273	-0,002	-0,07634
0,5	20	1,99637	0,694154	1,644103	1,05235	2,690524	2,696453	-0,0059	-0,21987
0,5	30	1,98221	0,729654	1,777778	0,941176	2,711864	2,718954	-0,0071	-0,26076
0,5	40	1,946723	0,781416	1,880052	0,85129	2,728139	2,731342	-0,0032	-0,11728
0,5	45	1,917742	0,813965	1,917742	0,813965	2,731707	2,731707	0	3,25E-14
0,5	50	1,880052	0,85129	1,946723	0,781416	2,731342	2,728139	0,0032	0,117417
0,5	60	1,777778	0,941176	1,98221	0,729654	2,718954	2,711864	0,00709	0,261438
0,5	70	1,644103	1,05235	1,99637	0,694154	2,696453	2,690524	0,00593	0,220358
0,5	80	1,490948	1,184325	1,999769	0,673462	2,675273	2,673231	0,00204	0,076396
0,5	89	1,348891	1,317866	2	0,666734	2,666757	2,666734	2,3E-05	0,000845
0,5	90	1,333333	1,333333	2	0,666667	2,666667	2,666667	0	3,33E-14

V/c	α (градус)	$t_2/(L/c)$	$t_3/(L/c)$	$t_5/(L/c)$	$t_6/(L/c)$	$(t_2+t_3)/(L/c)$	$(t_5+t_6)/(L/c)$	$\Delta t/(L/c)$	(Δt/(t2+t3))%
0,6	0	2,5	0,625	1,5625	1,5625	3,125	3,125	0	2,84E-14
0,6	1	2,500114	0,625079	1,588214	1,537087	3,125193	3,125301	-0,00011	-0,00347
0,6	10	2,510922	0,6329	1,829269	1,324426	3,143822	3,153695	-0,00987	-0,31305
0,6	20	2,537605	0,657158	2,096876	1,126984	3,194763	3,22386	-0,0291	-0,90256
0,6	30	2,561575	0,699489	2,325581	0,970874	3,261064	3,296455	-0,03539	-1,0736
0,6	40	2,55343	0,762844	2,480954	0,851487	3,316275	3,332441	-0,01617	-0,48512
0,6	45	2,526938	0,803688	2,526938	0,803688	3,330626	3,330626	0	1,33E-14
0,6	50	2,480954	0,851487	2,55343	0,762844	3,332441	3,316275	0,01617	0,48748
0,6	60	2,325581	0,970874	2,561575	0,699489	3,296455	3,261064	0,03539	1,085255
0,6	70	2,096876	1,126984	2,537605	0,657158	3,22386	3,194763	0,0291	0,910777
0,6	80	1,829269	1,324426	2,510922	0,6329	3,153695	3,143822	0,00987	0,314038
0,6	89	1,588214	1,537087	2,500114	0,625079	3,125301	3,125193	0,00011	0,003466
0,6	90	1,5625	1,5625	2,5	0,625	3,125	3,125	0	-2,8E-14

V/c	α (градус)	$t_2/(L/c)$	$t_3/(L/c)$	$t_5/(L/c)$	$t_6/(L/c)$	$(t_2+t_3)/(L/c)$	$(t_5+t_6)/(L/c)$	$\Delta t/(L/c)$	(Δt/(t2+t3))%
0,7	0	3,333333	0,588235	1,960784	1,960784	3,921569	3,921569	0	1,13E-14
0,7	1	3,333807	0,588324	2,008304	1,914367	3,922131	3,922671	-0,00054	-0,01376
0,7	10	3,379985	0,597161	2,480026	1,5472	3,977146	4,027226	-0,05008	-1,24351
0,7	20	3,510052	0,624818	3,049664	1,239567	4,13487	4,289231	-0,15436	-3,59879
0,7	30	3,686198	0,673983	3,539823	1,017812	4,360181	4,557635	-0,19745	-4,33238
0,7	40	3,826833	0,749752	3,809453	0,860283	4,576585	4,669737	-0,09315	-1,9948
0,7	45	3,84578	0,800016	3,84578	0,800016	4,645796	4,645796	0	0
0,7	50	3,809453	0,860283	3,826833	0,749752	4,669737	4,576585	0,093152	2,035406
0,7	60	3,539823	1,017812	3,686198	0,673983	4,557635	4,360181	0,197454	4,528573
0,7	70	3,049664	1,239567	3,510052	0,624818	4,289231	4,13487	0,154361	3,733142
0,7	80	2,480026	1,5472	3,379985	0,597161	4,027226	3,977146	0,050079	1,259171
0,7	89	2,008304	1,914367	3,333807	0,588324	3,922671	3,922131	0,00054	0,013766
0,7	90	1,960784	1,960784	3,333333	0,588235	3,921569	3,921569	0	-1,1E-14

V/c	α (градус)	$t_2/(L/c)$	$t_3/(L/c)$	$t_5/(L/c)$	$t_6/(L/c)$	$(t_2+t_3)/(L/c)$	$(t_5+t_6)/(L/c)$	$\Delta t/(L/c)$	(Δt/(t2+t3))%
0,8	0	5	0,555556	2,777778	2,777778	5,555556	5,555556	0	-3,2E-14
0,8	1	5,001828	0,555653	2,888228	2,672676	5,557481	5,560904	-0,00342	-0,06155
0,8	10	5,185231	0,565436	4,160083	1,929694	5,750667	6,089777	-0,33911	-5,56852
0,8	20	5,767674	0,596343	6,201563	1,411469	6,364016	7,613032	-1,24902	-16,4063
0,8	30	6,794416	0,652392	8,333333	1,086957	7,446809	9,42029	-1,97348	-20,9493
0,8	40	8,147843	0,741618	9,074205	0,878223	8,889462	9,952428	-1,06297	-10,6805
0,8	45	8,747791	0,802771	8,747791	0,802771	9,550562	9,550562	0	1,86E-14
0,8	50	9,074205	0,878223	8,147843	0,741618	9,952428	8,889462	1,062966	11,9576
0,8	60	8,333333	1,086957	6,794416	0,652392	9,42029	7,446809	1,973481	26,50104
0,8	70	6,201563	1,411469	5,767674	0,596343	7,613032	6,364016	1,249016	19,62622
0,8	80	4,160083	1,929694	5,185231	0,565436	6,089777	5,750667	0,33911	5,896885
0,8	89	2,888228	2,672676	5,001828	0,555653	5,560904	5,557481	0,003423	0,061591
0,8	90	2,777778	2,777778	5	0,555556	5,555556	5,555556	0	3,2E-14

V/c	α (градус)	t_2/(L/*c*)	t_3/(L/*c*)	t_5/(L/*c*)	t_6/(L/*c*)	(t_2+t_3)/ (L/c)	(t_5+t_6)/ (L/c)	Δt/(L/*c*)	(Δt/ (t2+t3))%
0,9	0	10	0,526316	5,263158	5,263158	10,52632	10,52632	0	1,18E-13
0,9	1	10,01098	0,526422	5,729361	4,855456	10,5374	10,58482	-0,04742	-0,44798
0,9	10	11,20467	0,537085	17,19953	2,697542	11,74175	19,89707	-8,15532	-40,9875
0,9	20	16,79977	0,571112	-43,3536	1,687564	17,37088	-41,666	59,03693	-141,691
0,9	30	55,3185	0,634146	-17,3913	1,186944	55,95264	-16,2044	72,157	-445,294
0,9	40	-41,4723	0,738134	-18,5748	0,906469	-40,7342	-17,6683	-23,0658	130,5489
0,9	45	-24,1569	0,812086	-24,1569	0,812086	-23,3448	-23,3448	0	0
0,9	50	-18,5748	0,906469	-41,4723	0,738134	-17,6683	-40,7342	23,06582	-56,6252
0,9	60	-17,3913	1,186944	55,3185	0,634146	-16,2044	55,95264	-72,157	-128,961
0,9	70	-43,3536	1,687564	16,79977	0,571112	-41,666	17,37088	-59,0369	-339,862
0,9	80	17,19953	2,697542	11,20467	0,537085	19,89707	11,74175	8,15532	69,45574
0,9	89	5,729361	4,855456	10,01098	0,526422	10,58482	10,5374	0,047418	0,45
0,9	90	5,263158	5,263158	10	0,526316	10,52632	10,52632	0	-1,2E-13

Conclusion: the results of calculations show that with a high degree of accuracy (at least, up to a ratio **v/c = 0,6** non-simultaneity **((Δt/(t_2+t_3))·100)** of the arrival of the light fluxes in the telescope **D** is not more than 3%) when the angle **α** of the orientation of the Michelson's interferometer in space the change of the interference pattern in the telescope **D** could not be registered for the errors occurred.

6. Conclusion

Negative results of the experiments by Michelson A.A. at the registration of the aether wind can be explained both with the help of the special theory of relativity and on the basis of the ether theory.

References

1. Albert A. Michelson, The relative motion of the Earth and the Luminiferous ether, The American Journal of Science, 1881, III series, vol. XXII, № 128, p. 120—129.

2. Conference on the Michelson–Morley experiment, Held at the Mount Wilson Observatory, Pasadena, California, February 4 and 5, 1927.

3. Дэвид Бом, Специальная теория относительности, Мир, Москва, 1967.

4. Боргман И.И., Новые идеи в физике, Сборник третий, Образование, Санкт-Петербург, 1912.

5. Бейзер А., Основные представления современной науки, Атомиздат, Москва, 1973.

6. Детлаф А.А., Яворский Б.М., Курс физики, том 3, Высшая школа, Москва, 1979.

7. Угаров В.А., Специальная теория относительности, Наука, Москва, 1977.

8. Соколовский Ю.И., Теория относительности в элементарном изложении, Наука, Москва, 1964.

9. Бергман П.Г., Введение в теорию относительности, Иностранная литература, Москва, 1947.

10. Макс Борн, Эйнштейновская теория относительности, Мир, Москва, 1972.

11. Академик Л.И. Мандельштам, Лекции по оптике, теории относительности и квантовой механике, Наука, Москва, 1972.

12. Эфирный ветер, Сборник статей под редакцией В.А. Ацюковского, Энергоатомиздат, Москва, 2011.

13. Франкфурт У.И., Специальная и общая теория относительности, Наука, Москва, 1968.

14. Меллер К., Теория относительности, Атомиздат, Москва, 1975.

15. Зисман Г.А., Тодес О.М., Курс общей физики, том 3, Наука, Москва, 1970.

16. Яворский Б.М., Детлаф А.А., Справочник по физике для инженеров и студентов вузов, Наука, Москва, 1968.

17. Фейнман Р., Лейтон Р., Сэндс М., Фейнмановские лекции по физике, Мир, Москва, 1965.

18. Крауфорд Ф., Волны, том 3, Наука, Москва, 1971.

19. Савельев И.В., Курс общей физики, том 3, Наука, Москва, 1970.

20. Калитеевский Н.И., Волновая оптика, Высшая школа, Москва, 1978.

21. Борн М., Вольф Э., Основы оптики, Наука, Москва, 1973.

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