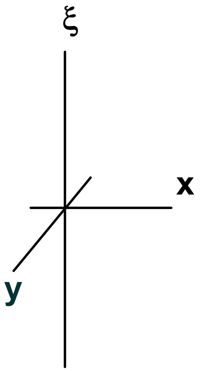
Part 2

"Lorentz transformations of coordinates based on the wave nature of elementary physical bodies of our world."



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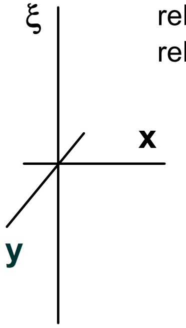
Part 2

Introduction.

The second part of the work deduces the Lorentz transformation for the spatial coordinates of the moving frame of reference. The conclusion will use the model of the focuses that have wave energy for elementary matter of our world. Fundamentals of models have been presented in Part 1, and all further proof relies on the fact that you have already viewed the first part of the presentation and understand its meaning. As before, there will be analyzed frames of reference that are natural for the nature of matter in our world. The model explains the reason for reducing of the sizes of the physical bodies moving uniformly in a straight line without rotation in absolute space, in a vacuum, in the absence of any force fields or other influences. Reducing body will be received absolute. I guess after these words, followers of the theory of relativity will be immediately discard this model as if it is flawed and, i think, they will not read the material this work at all.This is their characteristic point of view. Their main argument is if the decrease of size is an absolute, then principle of relativity is violated in inertial frames of reference and with help of experiment we are able to see that the frame of reference has motion relative to absolute space but this is contrary to reality.



Such an assessment may have occurred in relation to the first part of the work, which explains the nature of time. Nevertheless, this point of view is premature. The third part will show that in case of the inertial motion of material bodies in the absolute space inside of frame of reference of these bodies you cannot understand, what certain frames of reference remain at rest. It takes place because all inertial frames of reference of material bodies comply with the Lorentz transformation. Moreover, from the position of any moving inertial body (or bodies), a frame of reference that is at rest will be perceived by this body (or bodies) as an inertial frame of reference moving in the opposite direction and which complies with the same Lorentz transformation for the time and space coordinates. Here the text is deliberately used the term - the system of the body (bodies) because the effects of time dilation and decrease the size bodies are inherent for matter. These effects are not the properties of abstract space or frame of reference. These effects are associated with the wave nature of matter in our world only. The space in this presentation is introduced as an "absolute" and independent of the motion of material bodies. It is only the medium for wave objects in the form of waves or micro-object. If we compare together any of two or more frames of reference of material objects that are moving at different speeds relative to absolute space then all moving frames of reference will be subjected to the Lorentz transformations as well.

Such it is the nature of wave effects of matter in our world. Therefore, from point of view of inertial frames of reference based on the wave model of matter there do not exist the frame of reference at rest. This gives an illusory of the effect of the principle of relativity in absolute space. As it will be clear further the relativity effect occurs primarily due to changes in the flow time.

1. The physical explanation of the nature of the Lorentz transformation for the coordinates in the model of wave energy focuses and flows of time.

To derive the Lorentz transformation, we need analyze the following assumption. Has material body the change of physical dimensions when the body is at a motion? If it is so, then with help of this fact, it is possible to obtain the transformation of coordinates in accordance with changes of physical dimensions of bodies. I will briefly explain what it was said.

I think, the reader, without further explanation will understand by yourself that if you and all of material objects around you have been decreased by ten times then the absolute distance or material objects, that exist without the decreasing, are seeming for you as if they are increased by ten times.

Based on this fact, you would have to admit that the straightedge (ruler) for measuring the distance in your frame of reference should be reduced by ten times. This is the mechanism of the absolute conversion of unit of length for coordinate. However, the wave nature of matter implies the existence of the possibility of the relative changes of the spatial coordinates and time of the moving frames of reference. The reason for this is nature of the local (own) time of any of elementary micro-objects. Its flow has change at motion. But if absolute changes were not existing, there would be relative changes. Let's consider what way is changing the size of bodies at motion. To understand the reasons for reducing the size of the physical body at motion, let us remember the dominant physical factor that mainly determines the dimensions of the bodies of our world. In order to understand any natural phenomenon such an approach always is correct if you want to understand its physical nature.

I assume everyone knows that at a fixed temperature and an absence of other relevant factors, the real sizes of the physical bodies are determined by electromagnetic interactions between micro-objects of which they are composed. Electromagnetic interactions give the actual size of the atoms determine their bonds in molecules, etc. and the size of molecules determines the actual dimensions of the bodies of our world. Electromagnetic interactions are dependent on the electromagnetic force that exists in the analyzed physical frame of reference. But a magnitude of the electromagnetic force depends on the speed of propagation of the electromagnetic field and the properties of the micro-objects that are subjected to the action of electromagnetic force. Let's pass to the model of the focuss. it assumes that the properties of the micro-objects are associated with the properties of elementary focuses. The focuses consist of elementary waves and have the energy. The model allows the input of various kinds of waves in the form of the focuses that have wave energy. They form the elementary charges, the neutral masses, etc. It seems that there are a large variety of them but for the further proof we do not need do their analysis. Here, basic idea is that for all the variety of matter, the wave's energy of any of the focuses of micro-objects is not changing at inertial motion.

This idea was a main for the proof for the physics of time in the first part of the presentation. There used a model of a hypothetical point of the wave energy focus. Let' recall that the model does not have a mechanism that affects the structure of the wave energy focus at uniform rectilinear motion. It takes place because the mathematical model uses a model of hypothetical point. This point is an infinitely small. Only this mathematical point has the physical properties of the wave. Infinitesimal point cannot change its internal structure at motion. Therefore, the wave energy focus when it moves uniformly does not change its internal structure as well.

This is true not only of neutral bodies having mass, but the marked feature applies to the elementary charge. Moreover, in case of motion of micro-object of our world, its wave energy focus does not change its properties in order to absorb or give back of the energy. Therefore, if the statements are true then the using of their in the future should provide substantiation of conclusion of the Lorentz transformation. It will be logical proof of the correctness of the result.

But there is another factor that affects the strength of the electromagnetic interaction in an arbitrarily chosen inertial frame of reference. It is the speed of propagation of electromagnetic fields. To determine the speed it is sufficient to find the speed of light, because the light in nature has not only a corpuscular basis, but also light has electromagnetic features. The speed of light into moving inertial frame of reference has been found in the first part of this work. It was determined that inside any inertial frame of reference without a gravitational field, and when the frame of reference is uniformly and rectilinearly moving without rotation in vacuum, the speed of light remains constant. This effect arises because of the properties of the local (own) time of matter. I remind it briefly with help a few words.

The speed of light in absolute space is the absolute speed. And if there was observer at rest with invariable time, and if this observer would instantly register physical events, in this case, he noticed a change in the velocity of light in any of moving frames of reference. For example, if in a moving frame of reference, the light propagates in the direction of motion, in this case, the observer registers a lower speed of light in this frame of reference. The speed of light would be equal to **c' = c - v**, here **c -** is the absolute speed of light, **v -** is speed of movement of the inertial frame of reference. Due to the reduction of the speed of light in the moving frame of reference, the light would pass a shortened distance for a unit of time. Assume for example that the speed of light **c'** is decreased in five times. In this case, for absolute unit of time, the light passes in five times smaller absolute path. But the elementary substance does not have an absolute time. It has the local (own) time, which is distributed along the movement of the frame of reference. The law of distribution coincides with the formula of the Lorentz transformation for time. Speed of light as a physical quantity dependent on the two values of distance and time. Local time distribution gives a "temporary" effect. In order to understand the effect, let's consider a moving inertial frame of reference that has three material micro-objects, which are located in a single line along movement. In the frame of reference we fix a time moment. Let it is a local point of time of the material micro-object that placed in the center between the two extreme micro-objects and coincides with the emission of light. Consider the first micro-object located by the movement of the inertial frame of reference. The micro-object takes a flash of light from the central micro-object. Let the local (own) time of passage of light from the light source to the first micro-object is reduced because of slowing down the flow of time. In according to this model for the focuses that have wave energy, slowdown of the local (own) time of the first micro-object is directly proportional to reduction of the distance traveled by light in the moving inertial frame of reference. In our example, time is reduced by five times. The ratio of the distance that is decreased by five times and to time that also directly proportional decreasing by five times gives constant speed of light. This is the mechanism for the constancy of the speed of light for moving material micro-objects when the light propagates in direction of the motion.

If we consider the propagation of light in opposite to direction of the motion of micro-objects, in this case, to the absolute speed of light is added the speed of movement of material micro-object. Because of this, the speed of light is equal to **c' = c + v.** Therefore, inside of the moving inertial frame of reference during unit of time the light passes more distance. However, the second object that receiving the light will have a time that is increased in direct proportion. It takes place because of the increase the length of the time flow. The ratio between the increased distance and the increased time gives constancy of the speed of light for the second object. The whole mechanism was considered in the first part of this work for constancy of the speed of light (electromagnetic waves) inside of the moving inertial frame of reference.

Thus, in model of wave energy focus we have two factors. They should allow get the reduction of linear dimensions of bodies from purely physical considerations.

The first factor is the independence of the absorption of electromagnetic energy by the focuses that have wave energy from their movement. The second factor is the constancy of the velocity of propagation of electromagnetic energy for material objects at motion. Using these factors, we proceed to mathematical conclusions for physical changes of sizes in the physical body at inertial motion. After this conclusion we get the Lorentz transformation for the coordinates.

In order to analyze the changes in the linear dimensions of the body as it moves let's compare the sizes of the two identical bodies in a vacuum without the presence of any force fields. One of the bodies is at rest, and the second body is moving at a constant velocity **U=V**. Since we are interested in comparing of linear dimensions of bodies along the axes **x,y,z** inside of frame of reference at rest and along the axes **x ', y ', z '** in the moving frame of reference then the bodies can be in simplified form. For example, they can be by two identical cubes. See figure 1.

Figure 1.

To compare the size of the cube, we need to measure the distance between his ribs, and compare them with each other. Because the edges of the cube are parallel to each other we take points on the edges of any cube after we measure the distance between them. See figure 1. But since we have to consider the actual reduction of the material body, the points cannot be mathematical abstractions. Properties of points must correspond to the following requirements. First, their sizes have to be much smaller than the sizes of material bodies. Second, they must have physical properties of matter. The model for a focus that has wave energy satisfies the above conditions for the properties of matter. It was considered in part **1** of this work.

It is obvious, along the axis **Y '** and **Z '** the linear dimensions are identical for cube that has the motion. This is due to the symmetry of the axes with respect to the movement of the cube. Because of this reason, to evaluate the size of the cube along these two axes is enough to consider the change in size of the body along one of the axes, e.g., axis **Y '**. With such simplification, the analysis of cubes transforms into an analysis of two squares. See Figure 2.

Figure 2.

For the further analysis, the axes **Z** and **Z '** are unnecessary. They are replaced by axis ξ . This axis will reflect an existence of parallel space that is transmitting energy to the matter of our world. This energy gives existence and development of the matter of our world in time. See figure 3. Essence of the parallel space was already described in the first part of the work.

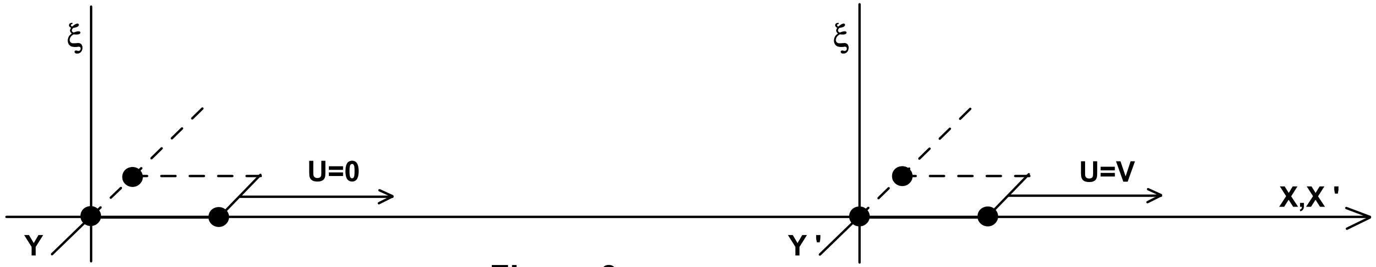


Figure 3.

Obviously, in order to compare the dimensions of the bodies from the two frames of reference, we need take one of them as "a primary frame of reference". Such frame of reference will be at rest. In frame of reference at rest, the body sizes are taken as "primary" too. We are interested in the answer to the following question. What are the dimensions of the body in a moving inertial reference frame? The answer is simple, the sizes are the same. Let me explain answer to this question.

Two factors create the reasons for immutability of the sizes of the body in the moving frame of reference. They are marked by previously. These factors are the following. The constancy of internal structure of a focus that has wave energy of the matter at motion and the constancy of the speed of propagation of electromagnetic interaction in all inertial reference frames. The propagation velocity of the electromagnetic interaction is determined by a speed of propagation of the electromagnetic field. Or if to say about it in other words, the speed is determined by the speed of light. This means that if after acceleration, you personally would be in a moving reference frame you asserted the following. Since the acceleration does not change all the internal components of the atoms and the propagation velocity of the electromagnetic field (light) in all directions then the size of any material object remain unchanged for me. But are there changes in body size? Yes. They appear when you compare the size of similar bodies in the two reference frames together. It takes place because in the moving reference frame, the speed of light is obtained a constant **c** due to the effect of time dilation.

In fact, the speed of light relative to absolute space is slowed down it indicates a decrease of transmission of electromagnetic energy. Weak electromagnetic energy creates less power, forcing the atoms are on small interatomic distances in material bodies. Therefore, the real sizes are also changed. The interatomic distance will be equal to distance wherein the atom receives the same energy per unit of time. It would be naturally to use the above statement to get a mathematical derivation for changes in body size that has a motion. In this case, if the proposed model is correct we should get a whole range of the relativistic changes in the body size. This requires an execution of only one requirement. Its essence is following. Within unit of time, light passes same distance between identical micro-objects in all inertial reference frames. The identical micro-objects are taken out of the same material bodies.That's all. In this case, the sizes of the same bodies in all inertial frames of reference are the same from the perspective of internal observers.

That is, let we are located in an inertial frame of reference and we accept time of passage of light between the two extreme micro-objects of a body as a standard unit of time, for this case, inside any other inertial frame of reference, these same micro-objects of same body will have the same distance, which a light will travel during standard unit of time. With this statement, it can be shown as in the moving frame of reference, the physical distance between the micro-objects are changing. Since the distance between the extreme micro-objects determines the real size of the physical body, they will show us how at motion, the size of the body has changes. However, before proceeding to mathematical analysis, we will do an intermediate proof, which will be used further. In proof we find relation between lengths of two flows from parallel space that give the development of two micro-objects in time for standard unit of time. One of the micro-objects will be absolutely at rest in our space, and the second micro-object will have inertial motion relative to the micro-object at rest. We need remember this conclusion. It will be used in further analysis.

Let's consider a frame of reference for a flow out of parallel space. Let the flow is passing through a micro-object at rest. The flow gives energy to the micro-object in order to sustain existence of micro-object over time and determines the rate of time. Each micro-object of our world has its own flow, so any micro-object exists in its local (own) time, and this property is inherent in all matter of our world. But the matter exists in the universe, and the universe has its global (total) time, regardless of the flows of matter. The micro-objects exist with own streams of time inside of the total time of the universe. Therefore, we can state for identical elementary particles unequal periods of life at the same time.

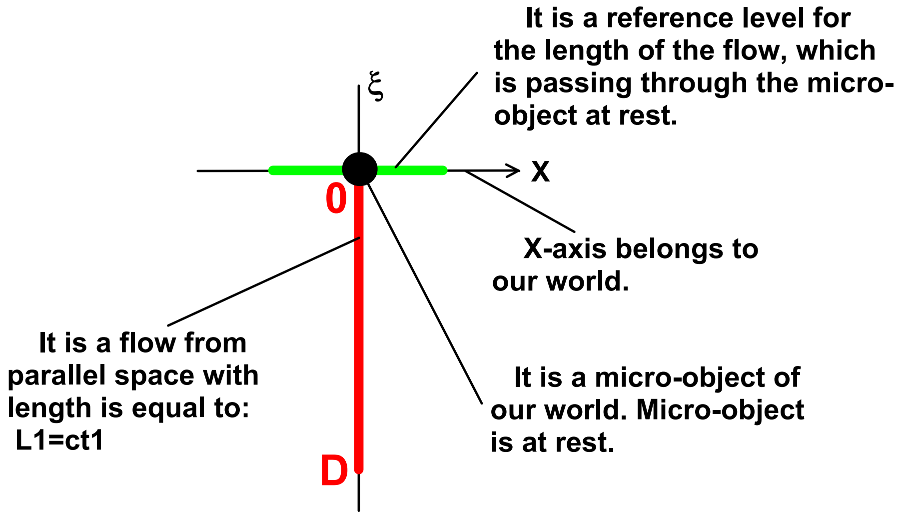


Figure 4.

Figure 4 in a form sufficient for analysis, displays all the above written. In figure 4, our space is reflected with x-axis as a single measurement. Other measurements for proof are unnecessary. The ξ-axis belongs to the parallel space. But remember that the upper half axis belongs to the internal part of the parallel space and the bottom half axis belongs to the external part of the parallel space. See the first part of the work. Internal part of the parallel space is subjected to high pressure. But since only a material substance may have the presence of pressure, it is necessary to use older model ether which fills the space and exists as an energy carrier.

The value of the ether pressure does not affect the further of the proof and, therefore, in this part of the work, it is not analyzed. When material objects absent inside our space the ether of the parallel space does not pass through our space. Ether passes through micro-objects of our world from the inner part of the parallel space to the external part of the parallel space. The passage of ether takes place through the channels of the focuses that are inside the micro-objects. When it takes place, ether transfers energy to the existence and development of micro-objects in time in our world. For this reason, this energy may be called time energy.

In Figure 4, the material object of our world is depicted with a black dot at the intersection of the axes **X** and ξ . As described in the first part of the work, such a micro-object in a form of simplified model corresponds to a model of a point mass. In fact, it is a focus of the wave energy that transfers ether from parallel space through itself at a constant speed is equal to the speed of light. The motion speed of ether is stabilized by the focus. In this mathematical analysis we don't need know the internal structure of the focus. Currently, you take it as a hypothesis. This approach is legitimate. After all, the whole subsequent analysis uses only one property of matter. It is its ability to stabilize passage of the ether of a parallel space through itself. How this is carried out - for this part of the analysis means nothing. In this work, the model uses an approach that has name "model of a black box." In the "model of a black box", an important feature is only its action. How the "black box" performs that action and what is its internal structure - for mathematical analysis this does not has a meaning. If you are not familiar with the similar model, you can check it by yourself. In order to understand all being said, I can give an example to illustrate the model of the "black box" as following.

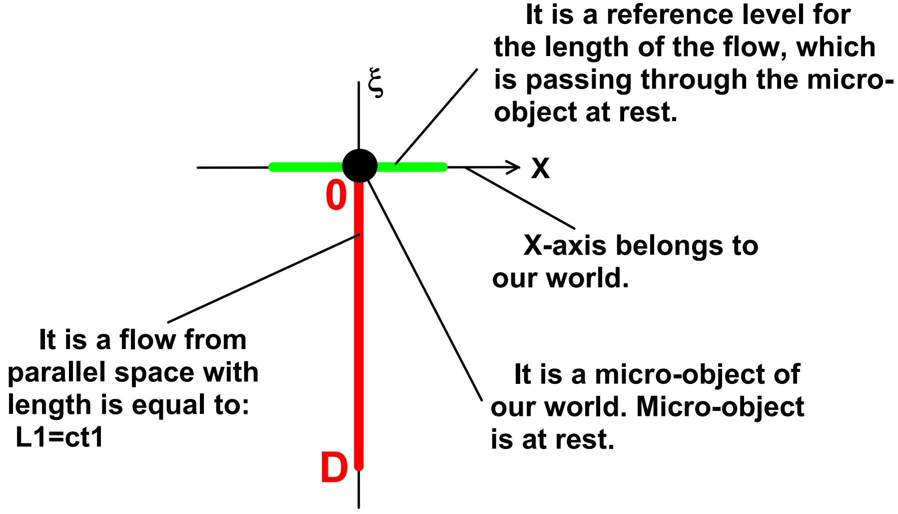


Figure 4.

Let us assume that there is the need to determine the time of your movement from one locality to another. To move you use some form of transportation. This may be a plane, a train or a car, anything. Is it important in order to determine time of your trip? Of course it isn't. Especially it isn't necessary to know the principle of action of the aircraft, trains, cars and their inner workings. For this problem, we can say that you got into some kind of "black box" that performed the function of a moving in space with such speed. That's all. Because if you know both distance and speed in this case, you can find time of your motion. In this work, applying a "black box" to the modeling of elementary substance gives a simple derivation of the Lorentz transformations. The approach is a simple. This approach should consider a point with mass that has of the properties of the wave's focus with energy of interchange between our world and parallel space.

These properties are listed in the work. Such a simple set of properties of matter provides numerous answers to existing fundamental laws of nature. From the answers it follows the main answer to the question about the being of our world that ancient philosophers had.

What is the universe around us, and what is matter of our world? On the first part of the questions, I have clear answer, but I think it is yet early in order to disclose publicly about this in detail. The answer to the second part of the question is obvious. All the material objects of our world, including you the reader, there are a set of waves in a specific form. They have an inverse movement, which is an inverting motion into a parallel space. In such movement, the object's wave doesn't move into the parallel space, it is stationary relative to the parallel space, and the space (ether) moves through the object. The speed of this movement, like the movement of the quantum of light is equal to the speed of light. In this case, we have a direct inversion of the movement into a "virtual motion". For understanding the physics, we can consider an example. It approximately reflects the essence of the "virtual movement". It is analogous to the movement of a photon in the reference frame, which is joined with the quantum of light. With respect to this reference frame, the quantum of light is at rest. Moreover, if you are in a state at rest in relation to the reference frame, then you could fixate the passage through a quantum of light of the ether of the space, and you should fixate the speed of the passage as is equal to the speed of light. Here is a rough analogy of the "virtual motion" of matter of our world.

Well, if all matter - it's the wave centered at the foci, it can be argued that matter is pure energy, although matter exists in special form between parallel worlds. And in essence, it is nothing, just an illusion of energy.

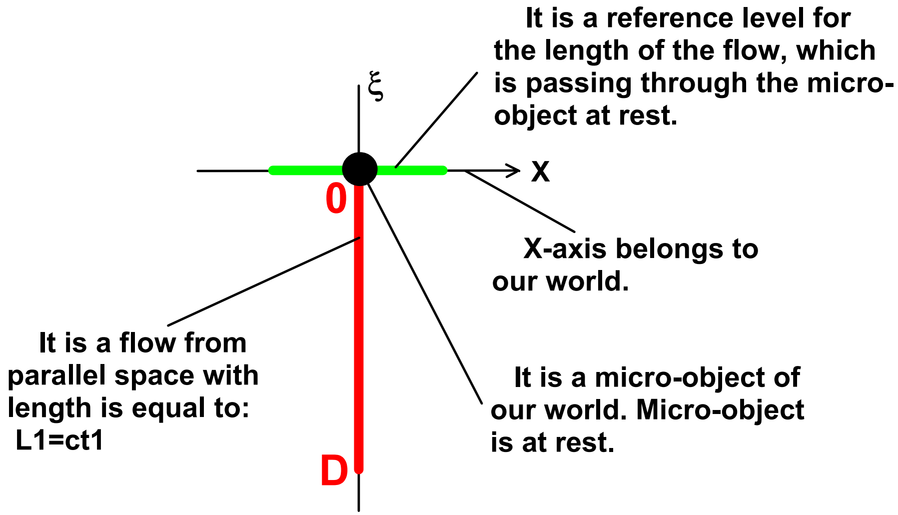


Figure 4.

Of course, I think that many would not agree, because the material world exists for perception and action, but, unfortunately, it is only the interaction energy foci in space and nothing more.

Look again at Figure 4. It shows a system that has a rough analogy to the reference system, which is joined with a moving light quantum.

Considered micro-object is at rest in our space. In Figure 4, the only one **X**-axis shows our space. The micro-object is at rest in our world. Due to this, the flow direction from the parallel space is perpendicular to our space. On figure 4, it is shown relative to **X**-axis. To determine the length of passage of the parallel space through the micro-object, we introduce a level of reference. It must coincide with the micro-object and the level has to be the perpendicular to the direction of flow from the parallel space.

The reference level will correspond completely to such conditions, if it coincides with the **X** -axis and passes through the center of a micro-object. In Figure 4, the green segment shows the reference level. It is disposed on the **X**-axis. As it is mentioned earlier, the flow passes from inner part of parallel space into the external part of parallel space through a micro-object. In figure 4, this flow corresponds to the motion along the ξ -axis downward. The flow passed through the micro-object during the time **t1**. It is shown with the segment in red (**0D**). The upper part of the flow isn't shown. This part of the flow doesn't affect the micro-object and, it has no sense, to display this part on Figure 4 and on subsequent figures. The length of the segment (**0D**) is equal to **L1=ct1**. The value **c** is speed of light. Let us assume that the length of the flow allows to evolve the micro-object for its local (own) time that is equal to one unit of time, i.e. **t1=1**. We take this length as a sample (standard) for the flow.

Now we leave analysis of the micro-object at rest and proceed to the analysis of the reference frame of a moving micro-object. Let the micro-object moves by inertia and it moves without rotation relative to the micro-object at rest. Its velocity is equal to **V** and the micro-object moves along the positive half of **X**-axis. Frame of reference of moving micro-object, we combine with the previous frame of reference. See a figure 5.

At the time t_2 the moving micro-object settles at point **B**. On figure 5, a black dot corresponds to this micro-object. During the time t_2, along the positive **X**-axis micro-object travels a distance that is equal to vt_2. The time t_2 corresponds to the time when the moving micro-object receives from the parallel space a portion of energy that is equal to one unit. When and how the moving micro-object will receive this energy, we will analyze with help of the Figure 5, in detail.

At first, let's consider the overall flow of parallel space, which passes through the moving micro-object. It is equal to the segment **BD** = $L_2 = ct_2$, the value **c** is velocity of light. Total flow is formed by the two components.

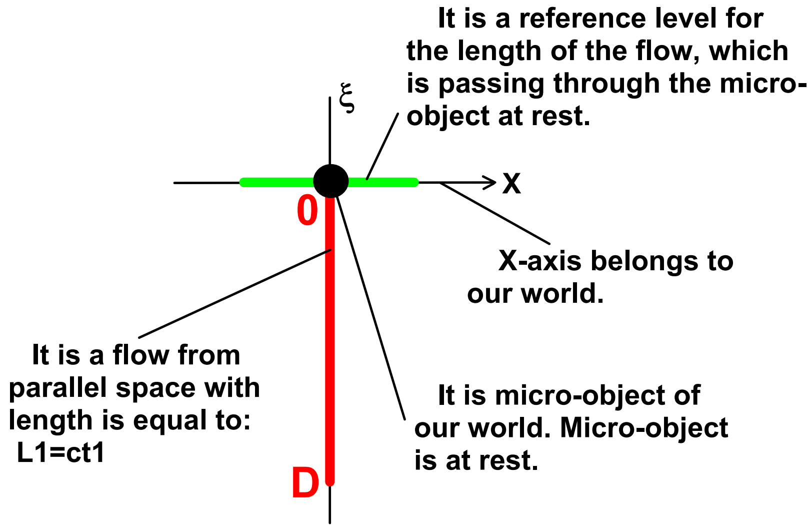


Figure 4.

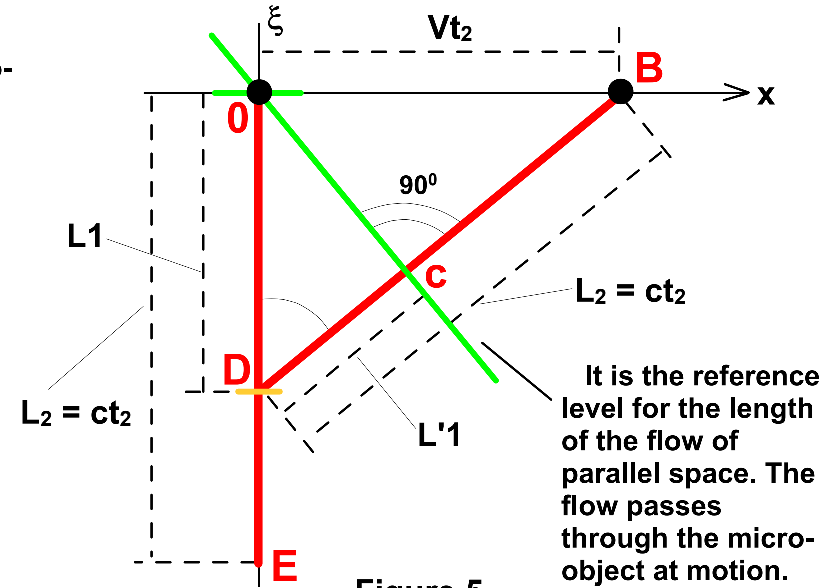


Figure 5.

The first of components of the flow takes place because of movement of the micro-object along the **X**-axis and it is equal to **0B = vt_2**. Flow component **0B** appears due to the inertial motion of the micro-object. The inertial motion is supported by the energy of the vertical passage of ether of the parallel space through micro-object, but this component does not transfer energy to the micro-object. See the first part of the work and the chapter. 2. The physics of relativistic delay of time of the elementary micro-object.

The second component of the flow is formed by the pressure of the ether of parallel space along an axis ξ and it is equal to the segment (**0D**). This component transfers energy to the micro-object. Figure 5 shows that the movement of the micro-object is fixed at time **t_2**, when the length (**0D**) is the length of **L1**. Such a flow length of the parallel space has given to the micro-object at rest a development in time that is equal to one standard unit. See figure 4. This length of flow gives the same development in time of the moving micro-object too. The development in time is equal to the same unit of time. The proof of this will be done below. Because the micro-object moves, the vertical velocity of the parallel space decreases and becomes equal to **$U=(c^2-V^2)^{1/2}$**. Such velocity slows down the speed of the transfer of the unit of energy to the micro-object at motion. Because of this reason, the moving micro-object receives unit of the energy from parallel space much later than the micro-object at rest. So by the time **t_2** through the motionless micro-object is held the flow of parallel space and its length is greater than the length of **0D = L1**. At the moment of time t2 this length will be determined by the interval **0E=L_2=ct_2** and it is equal to the length of **BD**. See figure 5. All of this was listed to you, to understand that the process of energy transfer into micro-object at rest and a moving micro-object is a non-simultaneous. For a moving micro-object, this process is completed more lately.

We now turn to the analysis, which shows that a single portion of the energy from the parallel space gives the unit of time not only to a micro-object at rest but also to a micro-object at motion. At first, for flow from parallel space we introduce a reference level for a micro-object at motion. It is needed to determine the length of flow from the parallel space, which gives energy to the moving micro-object for development over time. This level must always be perpendicular to the flow and pass through the micro-object at rest, since in time zero the two bodies were located together. This arrangement provides a count level of energy transfer to micro-object for any time from zero to the actual point in time.

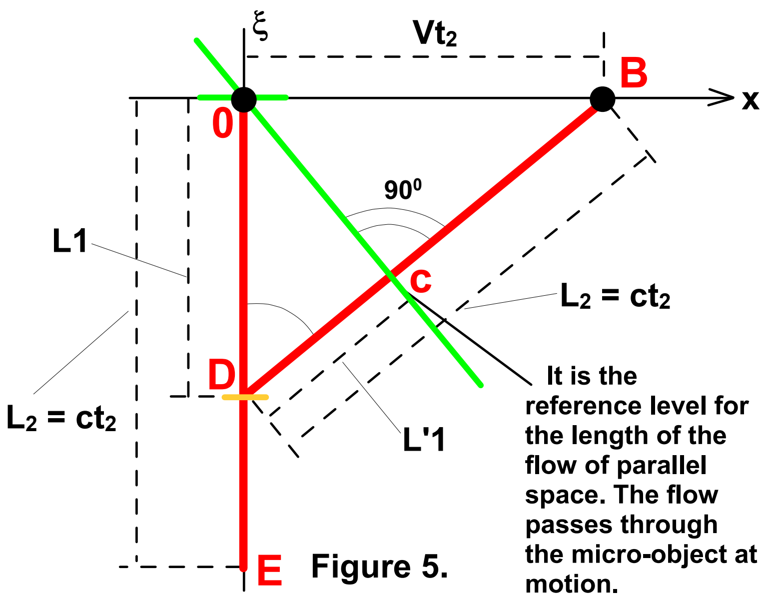


Figure 5.

In figure 5, the green segment (**0C**) depicts this level. For continuity the figures 4 and 5 in figure 5, for micro-object at rest the reference level is retained for flow from parallel space. The level is depicted with help a short, green segment. As before, it coincides with the **X**-axis.

In the first part of the work it was explained, which out of parts of the flow is giving energy to micro-object in order to develop the micro-object for time. In figure 5 this part of the flow is equal to the segment (**DC**). Its length corresponds to the transfer of energy during unit of time. This is truth although the figure 5 shows the difference of the lengths between the segments (**D0**) and (**DC**). Let's perform simple proof of what was said. For this from the first part of the work, recall the next. A flow that is located below reference level gives the time of development (of life) to the micro-object at rest and it is equal to

$$t = \frac{L}{c}$$

11 In figure 4, the segment (**0D**) has been introduced as a unit of time for flow: **0D = L1=ct1**. Hence, for a micro-object at rest, a unit of time is determined by value that is equal to

$$t1 = \frac{L1}{c} .$$

So, for a micro-object at rest, the unit of time has been determined. We take it as a sample (standard). Let's now turn to the moving micro-object. Previously, the following requirement was made for this micro-object. The moving micro-object has to move up to the time t_2 when along the ξ -axis, the flow component from parallel space becomes equal to **L1**. As it defined earlier, the velocity of the flow component is equal to $U=(c^2-V^2)^{1/2}$. In this case, at time t_2 the flow length will be equal to $t_2(c^2-V^2)^{1/2}$. If we comply with the requirement of equality for the transmission of unit of energy in time t_2, then we obtain the equality

$$L1 = t_2 (c^2-V^2)^{1/2} \qquad (1).$$

From equation (1) we can find the time t_2. It is equal to

$$t_2 = \frac{L1}{(c^2-V^2)^{1/2}} = \frac{L1}{c[1-(V/c)^2]^{1/2}} = \frac{t1}{[1-(V/c)^2]^{1/2}} .$$

As it was shown in the first part of the work for the moving micro-object, a flow from parallel space that has passed beyond the reference level (it is segment **DC**) gives the own time (**t '**) and it is equal to

$$t' = \frac{t - \frac{V}{c^2}X}{[1-(V/c)^2]^{1/2}} .$$

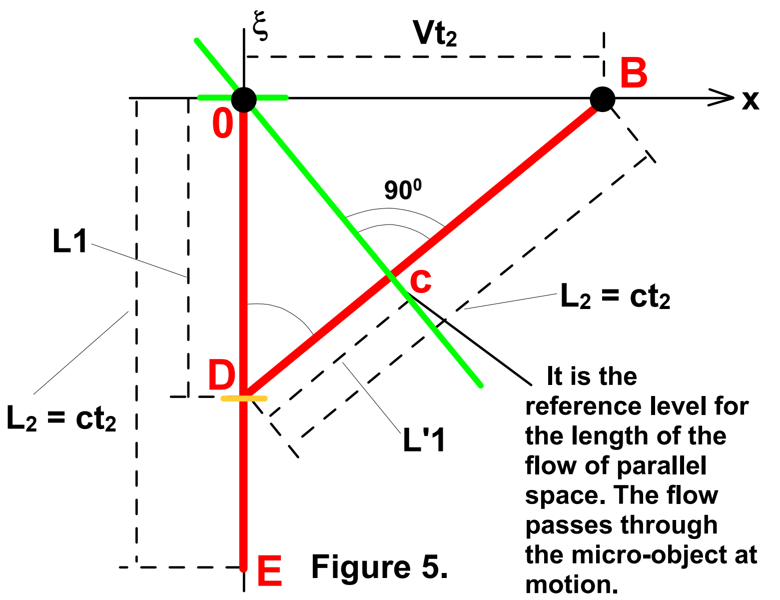


Figure 5.

Figure 5 shows that for the moving micro-object, a time (**t**) is equal to $t=t_2$, and $X=Vt_2$. Substituting these values into the formula for (**t '**), we obtain:

$$t' = \frac{t - \frac{V}{c^2}X}{[1-(V/c)^2]^{1/2}} = \frac{t_2 - \frac{V}{c^2}Vt_2}{[1-(V/c)^2]^{1/2}} =$$

$$= \frac{\frac{t1}{[1-(V/c)^2]^{1/2}} - \frac{V}{c^2}V\frac{t1}{[1-(V/c)^2]^{1/2}}}{[1-(V/c)^2]^{1/2}} =$$

$$= \frac{t1[1-(V/c)^2]}{1-(V/c)^2} = t1 .$$

This equality is required to proof: **t '=t1**.

The equality says that the flow's length (**DC**) that has been passed through the reference level at time t_2 gave the energy to the body for development of time that is equal to unit of time.

However, in order to further explain the physics of changing sizes of the body we need define the link between the length of the flow (**DC**) and flow (**D0**). To find this relationship, let's denote the length (**D0**) by **L1**, and (**DC**) via **L'1**, i.e. (**D0**) **= L1**, and (**DC**) **=L'1**. The relationship between the lengths of the flows will be equal to

$$L'1 = L1[1-(V/c)^2]^{1/2} \qquad (2).$$

Let's prove the expression (2). Its conclusion can be obtained from similar triangles ∆ **0BD** and ∆ **D0C**. See figure 5. These triangles are similar to each other because they are straight and have a common angle. These angles are angle **0DC** and angle **0DB**. Since the considered triangles are similar, then there is the equality of relationship of the sides:

$$\frac{DC}{D0} = \frac{D0}{DB} = \frac{t_2(c^2-V^2)^{1/2}}{ct_2} = [1-(V/c)^2]^{1/2}$$

Or $DC = D0[1-(V/c)^2]^{1/2}$.

Substitution of the values **DC** and **D0** in the last expression gives to us expression (2).

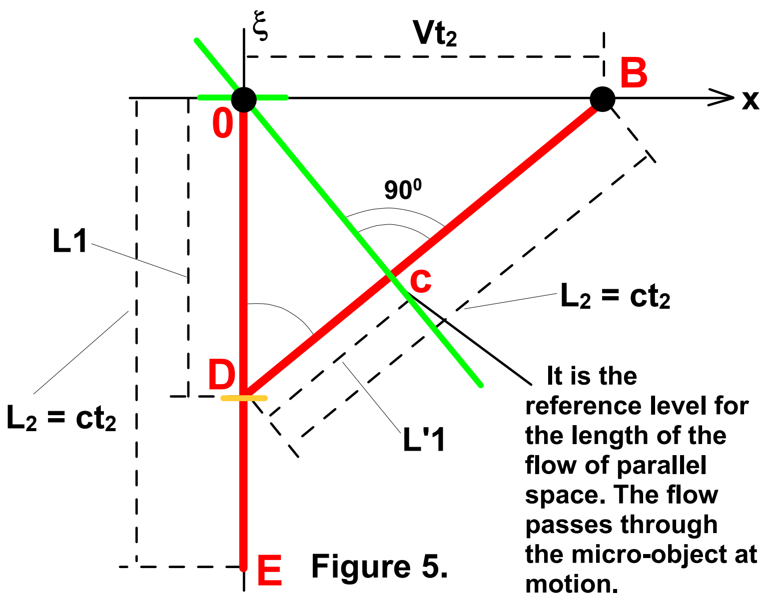


Figure 5.

After the equation (2), we can move on to the main conclusion of this part. Consider the Lorentz transformations for the space coordinates of the reference frame of a moving body.

2. The proof of the immutability of body size in the transverse direction with respect to its motion.

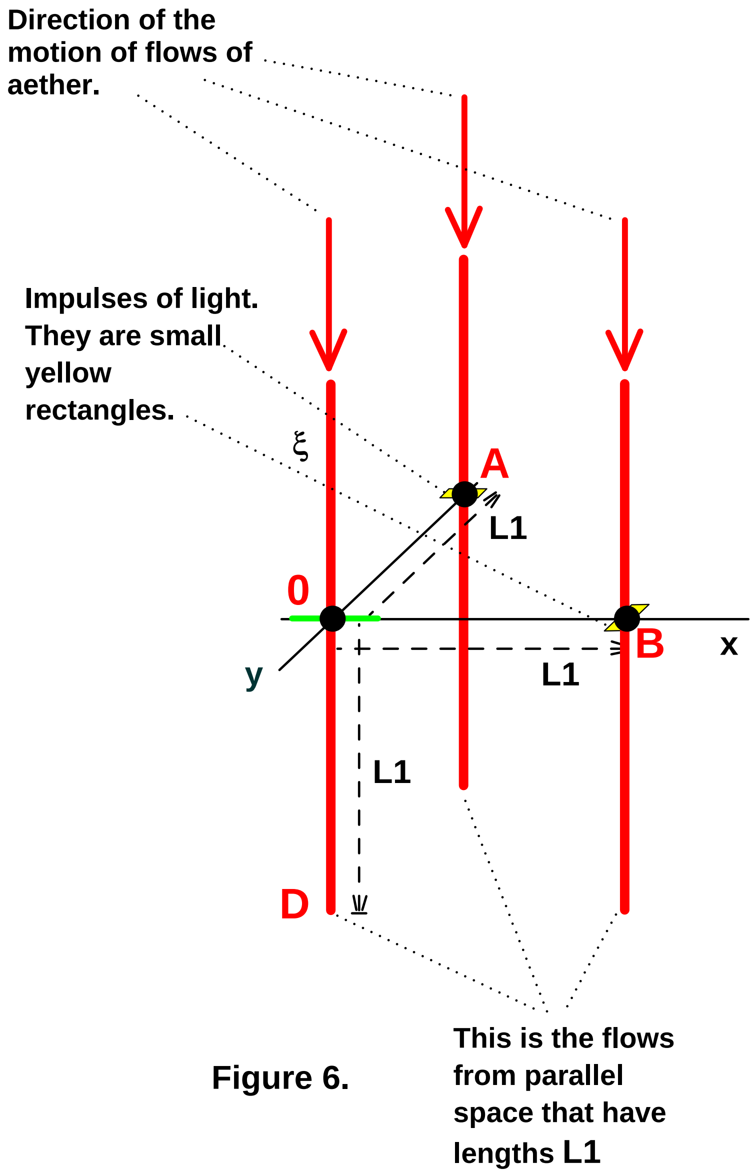


Figure 6.

To do this, let's consider on the first stage an isolated reference system ξ **,X,Y** that is at rest with three micro-objects. See Figure 6. On this figure at time zero, a micro-object that is located in the center of the system emits two impulses of light. Impulses propagate along the axes **X,Y**. Figure 6 shows the impulses with help of small yellow rectangles.

On the axes **X,Y** at the distance **L1** there are two micro-objects. During time **t1**, each impulse of light travels a distance **L1** and reaches a micro-object. Since all the micro-objects are at rest, the flows from the parallel space go with a maximum speed that is equal to the speed of light. Therefore, the length of any flow that passed through the micro-object is also equal to the length **L1**. From a time zero up to time **t1**, any of flows provides development over time (existence) for each of micro-objects that is equal to **t1 = L1/c**. As previously noted, the values of **t1** and **L1** are accepted standards of the units. And micro-objects that are on the axes correspond to the extreme points of material cube at rest with edge length is equal to **L1**. Once again, you look at Figures from numbers 1 to 3, and read the accompanying comments to them.

Now, when we have the standards for the time and the distances between the micro-objects we can proceed to analysis of the changes in linear dimensions of the moving micro-object. But before, let's come back to the figure 6. It is obviously that the flows passing through the micro-objects have the same length. Therefore, to simplify the animation of the physical processes it is reasonable not to show flows that pass through the micro-objects are located at the points **(A,B)**. But in further analysis, we should remember of the equivalence of all flows passing through the micro-objects in a frame of reference at rest.

Consider the same body (cube) at motion. For the analysis of its sizes, as before, we will not consider directly the cube. We will consider micro-objects of the cube, which are located on edges of the cube. Assume that they are arranged on the axes **X ',Y '** and in the center of the moving frame of reference. Let us turn to the new figure 7.

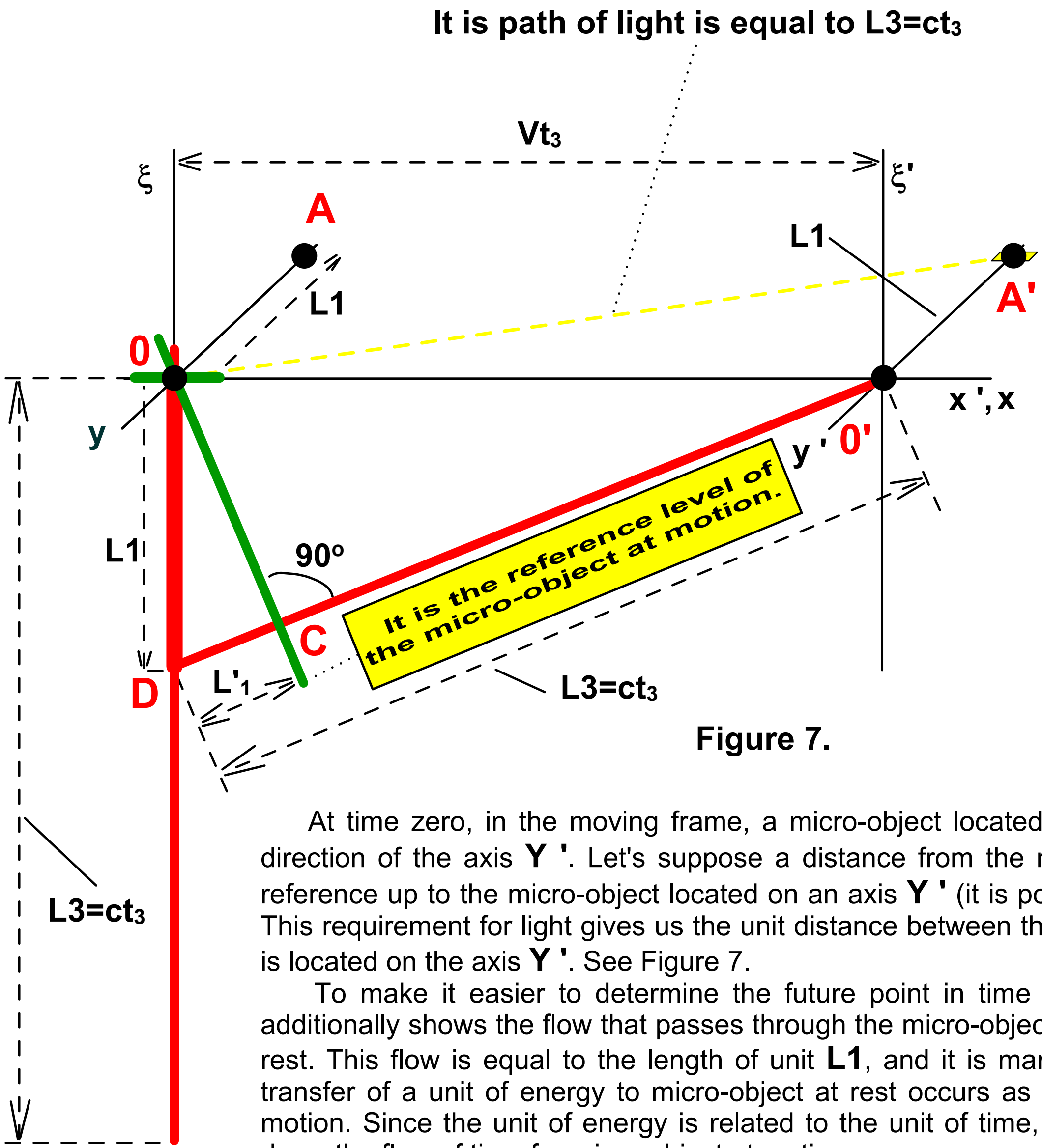


Figure 7.

In the beginning we will analyze a size of cube at motion with help of micro-objects. At first, the size will be considered along axis that is normal to its motion. At time zero, we combine a frame of reference at rest and a moving frame of reference by their centers. The great need in order to use a reference frame at rest in the future proof there is not. But for a better understanding of the physical processes that will be described later, it is better to leave the frame of reference at rest with its micro-objects. It will enable to visually see the standard units of lengths for the flows and distances on the axes **X ',Y '**. However, since at time zero the two frames of reference are coincide with each other; we cannot have the two physical micro-objects that are combined their centers. In this case, these micro-objects are obtained as if they are inserted into each other. However if we assume that they are close to each other, and their size is much smaller than the distances at which the processes are considered, the proof does not introduce inaccuracies in those assumptions. We can even enter a frame of reference with micro-objects that is at rest as an imaginary. It is necessary, in order to analyze the flows from parallel space and distances between the micro-objects. They should have standard lengths. All of the above will become clear from the following figures.

At time zero, in the moving frame, a micro-object located in the centre (it is point **0 '**) emits the light in the negative direction of the axis **Y '**. Let's suppose a distance from the micro-object that is located in center of the moving frame of reference up to the micro-object located on an axis **Y '** (it is point **A '**) is equal to the passage of light impulse per unit time. This requirement for light gives us the unit distance between the micro-object located in the center and the micro-object that is located on the axis **Y '**. See Figure 7.

To make it easier to determine the future point in time that gives the moving micro-object a unit of time, Figure 7 additionally shows the flow that passes through the micro-object at rest. It is located in the center of the frame of reference at rest. This flow is equal to the length of unit **L1**, and it is marked with thickened line. You can visually see that the event transfer of a unit of energy to micro-object at rest occurs as a first event if it is considered relative to the micro-object at motion. Since the unit of energy is related to the unit of time, this is clearly showing the physics of the process of slowing down the flow of time for micro-object at motion.

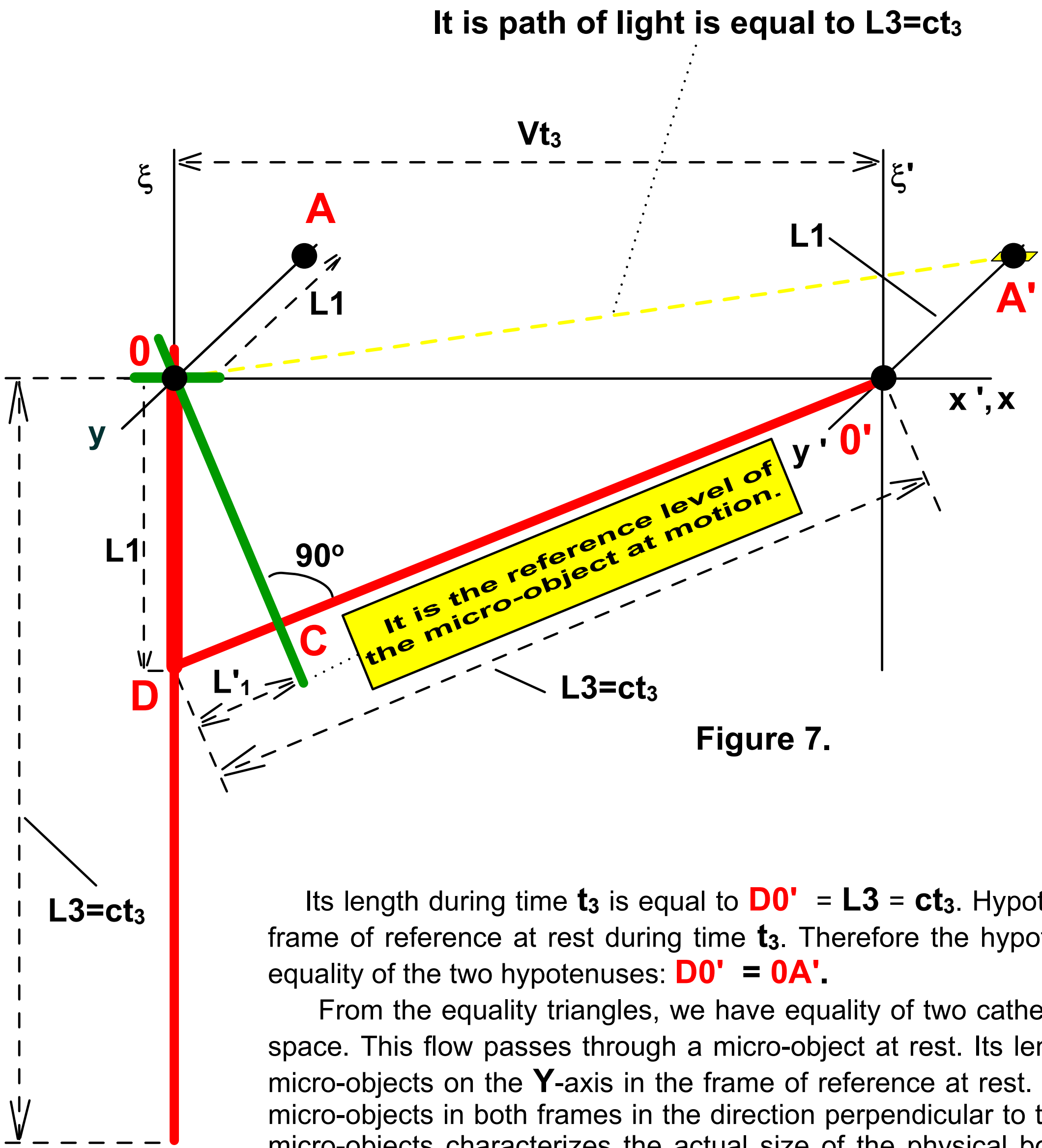


Figure 7.

At time t_3 (this is time of the reference frame at rest), when on axis ξ projection (**D0**) of the flow from parallel space (see segment **D0'**) becomes equal to **L1**, in this case, an energy equal to one unit has transmitted to the moving micro-object (it is located at point **0'**). Because of this energy, the time of a moving micro-object will be equal to one unit of time **t1**. See the micro-object that is located in the center of the moving frame of reference (it is a point **0'**). All micro-objects, which can be located on the axis **Y'**, have the same time. Because of this reason the time also is equal to **t1** for the micro-object that is located at the point **A'**.

After, in the moving frame of reference, we have introduced a requirement for a unit time, we can determine the actual distance on the axis **Y '** 'between the micro-object located at the center (it is the point **0'**) and the extreme micro-object (it is the point **A'**). This distance is equal to the segment **0'A'**, which gives us a metrics of the cube in the moving frame of reference.

We define length of the segment **0'A'**. To do this, let's examine the two right-angled triangles. See Figure 7. The first right-angled triangle is Δ **0D0'**. The second right-angled triangle is Δ **00'A'**. These triangles are equal to each other, because the hypotenuse **D0'** and cathetus **00'** of one triangle are equal to the hypotenuse **0A'** and a cathetus **00'** of another triangle. Cathetus **00'** is common for the triangles. Flow speed of parallel space (see segment **D0'**) is passing through a micro-object at motion has the speed of light.

Its length during time t_3 is equal to **D0'** = **L3** = **c**t_3. Hypotenuse **0A'** corresponds to the path that is passed by light in frame of reference at rest during time t_3. Therefore the hypotenuse **0A'** is also equal to **L3** = **c**t_3. Hence we obtain the equality of the two hypotenuses: **D0' = 0A'.**

From the equality triangles, we have equality of two cathetuses **0'A'** and **0D** but the cathetus **0D** is flow from parallel space. This flow passes through a micro-object at rest. Its length (**L1**) is equal to a unit of distance **0A=L1** between the micro-objects on the **Y**-axis in the frame of reference at rest. Thus, we have the equality of the unit of length between the micro-objects in both frames in the direction perpendicular to the motion. And due to the fact that the distance between the micro-objects characterizes the actual size of the physical bodies in both frames of reference, it can be argued that the metrics frames of reference in the direction perpendicular to the motion do not change, and we have to have the equality **Y=Y'** and **Z=Z'**.

Let us analyze the distances between micro-objects along their motion. Refer to Figure 8.

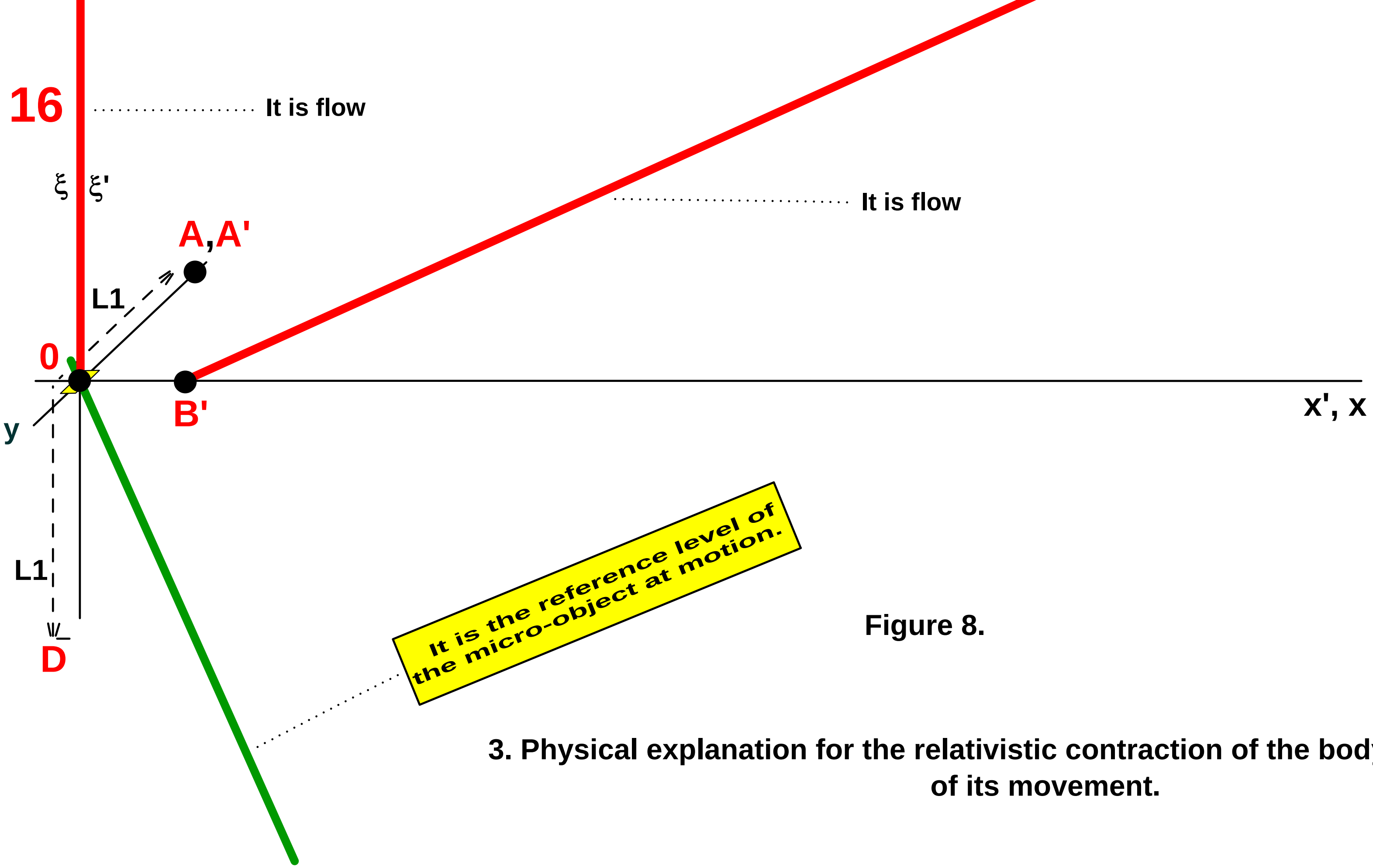


Figure 8.

3. Physical explanation for the relativistic contraction of the body in the direction of its movement.

As before, let's place the first micro-object in the center of the moving frame of reference and we put the second micro-object on some distance on the axis **X'** at point **B'**. Let the positive direction of the **X'** -axis coincides with the direction of movement. We assume that in the same zero time (see Figure 7) micro-object that is located in the center emits light impulse along positive direction of axis **X'**. We need to put a micro-object on the axis **X'** into such a point **B'** for which time of the passage of the light pulse to be equal to $t_{B'} = t1$.

In order to have a link with the previous figure in this figure the propagation of light impulse is left along the **Y'**-axis.

Time $t_{B'}$ for micro-object that is located in point **B'** will be measured relative to the old level of reference. It has been used for micro-object that is located at the point **0**. Such a measurement would give the equivalence of energy states for a time of two micro-objects (see points **A'** and **B'**).

Let' determine, when micro-object at the point **B'** will have a time is equal to $t_{B'} = t1$.

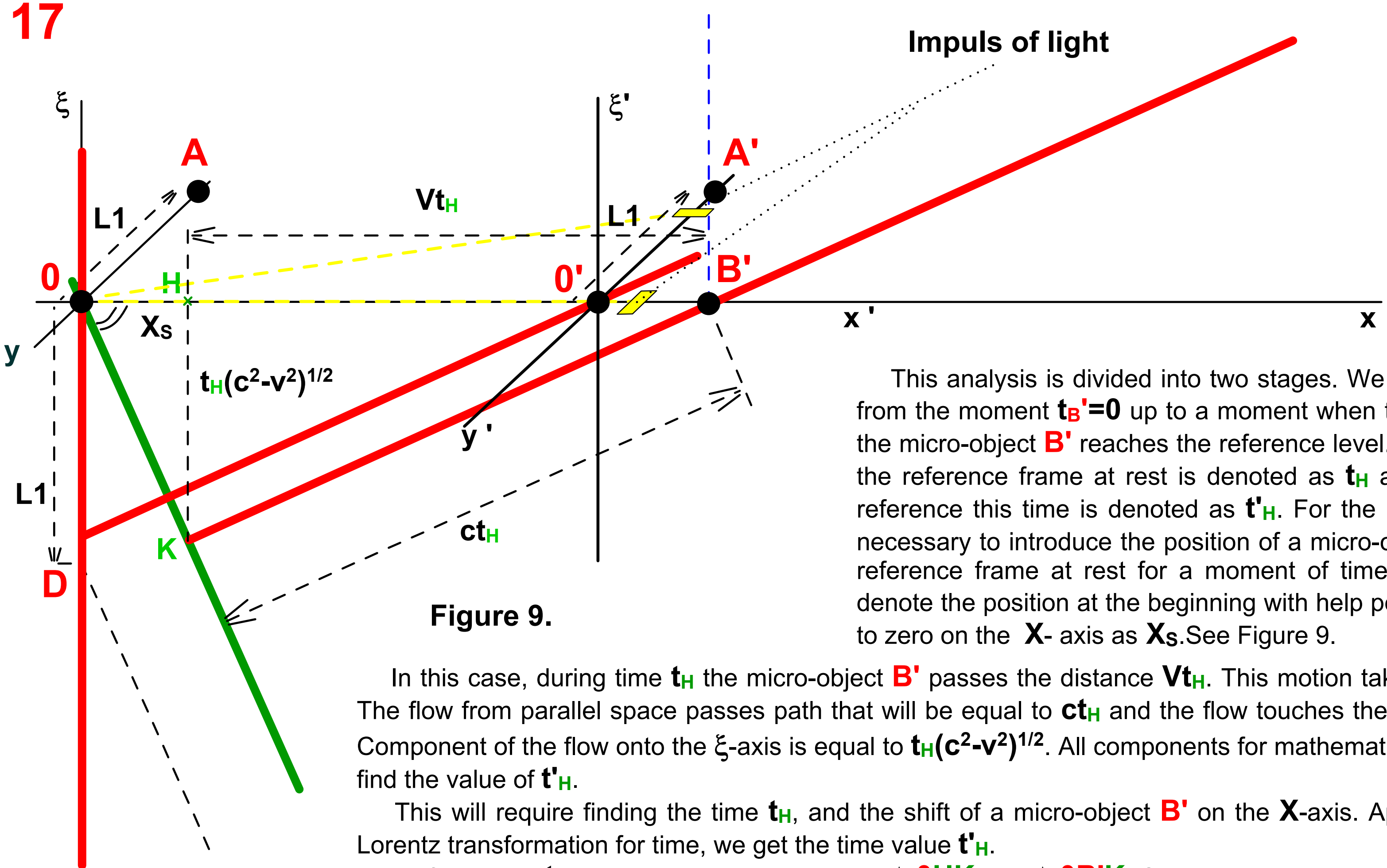


Figure 9.

This analysis is divided into two stages. We will consider the first stage from the moment $t_B'=0$ up to a moment when the flow of parallel space of the micro-object **B'** reaches the reference level. The time of this process in the reference frame at rest is denoted as t_H and in the moving frame of reference this time is denoted as t'_H. For the mathematical analysis, it is necessary to introduce the position of a micro-object **B'** on the **X**-axis in a reference frame at rest for a moment of time that is equal to zero. We denote the position at the beginning with help point **H**, and the shift relative to zero on the **X**- axis as X_S.See Figure 9.

In this case, during time t_H the micro-object **B'** passes the distance Vt_H. This motion takes place from the point **H**. The flow from parallel space passes path that will be equal to ct_H and the flow touches the reference level at point **K**. Component of the flow onto the ξ-axis is equal to $t_H(c^2-v^2)^{1/2}$. All components for mathematical analysis introduced, we find the value of t'_H.

This will require finding the time t_H, and the shift of a micro-object **B'** on the **X**-axis. Applying these values to the Lorentz transformation for time, we get the time value t'_H.

To find value t_H, let's consider two triangles Δ **0HK** and Δ **0B'K**. See Figure 9. These triangles are similar to each other. From the triangles we get the equality of relations:

$$\frac{KB'}{0K} = \frac{HK}{X_S} \quad \text{или} \quad KB' = \frac{0K \cdot HK}{X_S}$$

We substitute the value $KB'=ct_H$ in the last expression and we get

$$t_H = \frac{0K \cdot HK}{c \cdot X_S}$$

The value (**HK**) is known. See Figure 9. It is equal to $HK= ct_H[1-(V/c)^2]^{1/2}$. Substituting the value of **HK** in the last equality, we come to expression:

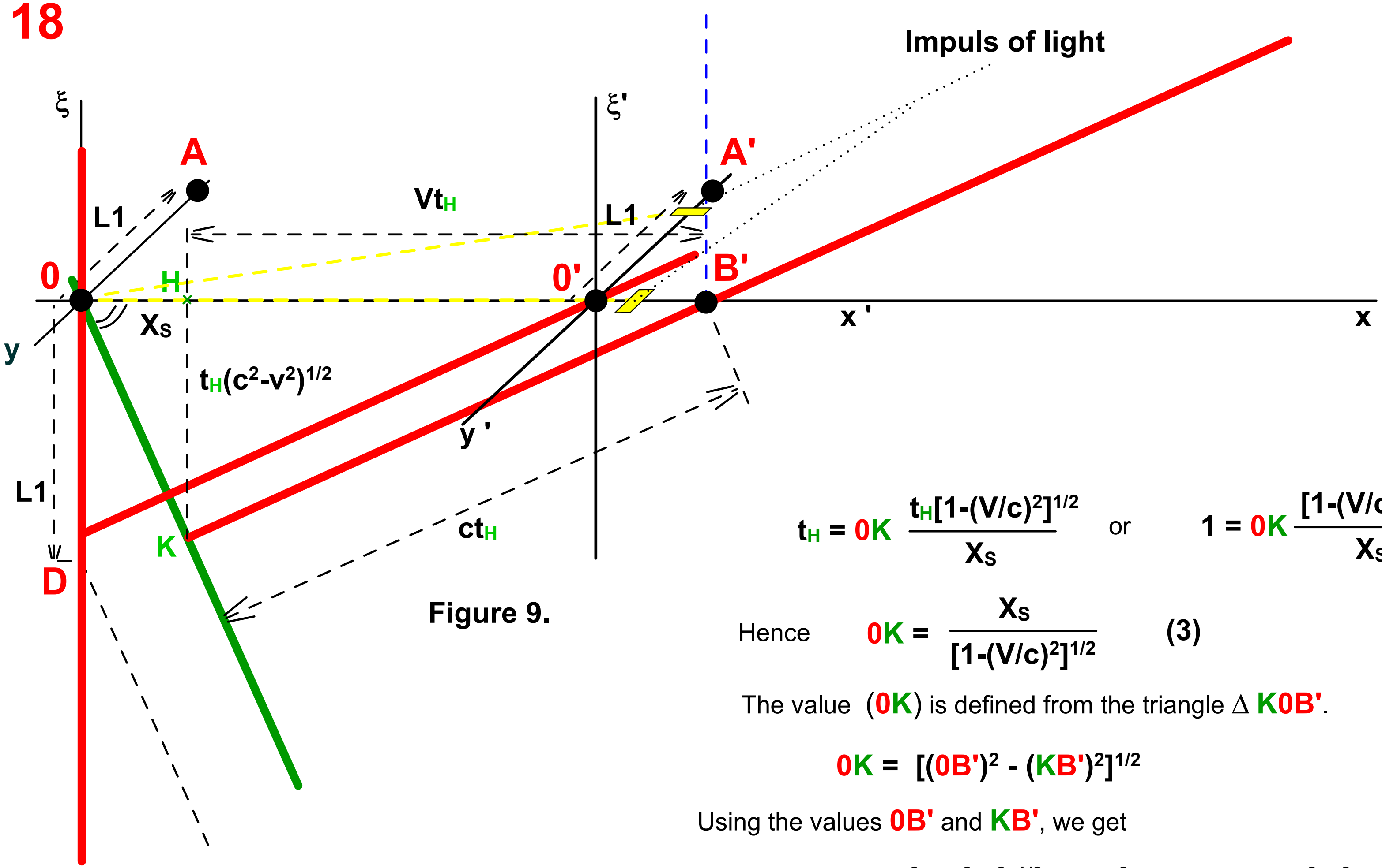


Figure 9.

$$t_H = 0K\,\frac{t_H[1-(V/c)^2]^{1/2}}{X_S} \quad \text{or} \quad 1 = 0K\,\frac{[1-(V/c)^2]^{1/2}}{X_S}$$

Hence $$0K = \frac{X_S}{[1-(V/c)^2]^{1/2}} \qquad (3)$$

The value (0K) is defined from the triangle Δ K0B'.

$$0K = [(0B')^2 - (KB')^2]^{1/2}$$

Using the values 0B' and KB', we get

$$0K = [(X_S + Vt_H)^2 - c^2t_H^2]^{1/2} = (X_S^2 + 2X_SVt_H + V^2t_H^2 - c^2t_H^2)^{1/2}$$

We return to the expression (3). Take the left and right sides of the equation into the square.

$$[1-(V/c)^2]\,(0K)^2 = X_S^2$$

Use the value of 0K and remove the brackets. After, let's group the homogeneous members in the expression.

$$[X_S^2 + 2X_SVt_H + V^2t_H^2 - c^2t_H^2]\cdot(1 - V^2/c^2) = X_S^2;$$

$$(1 - V^2/c^2)X_S^2 + 2(1 - V^2/c^2)X_SVt_H - (1 - V^2/c^2)^2c^2t_H^2 - X_S^2 = 0;$$

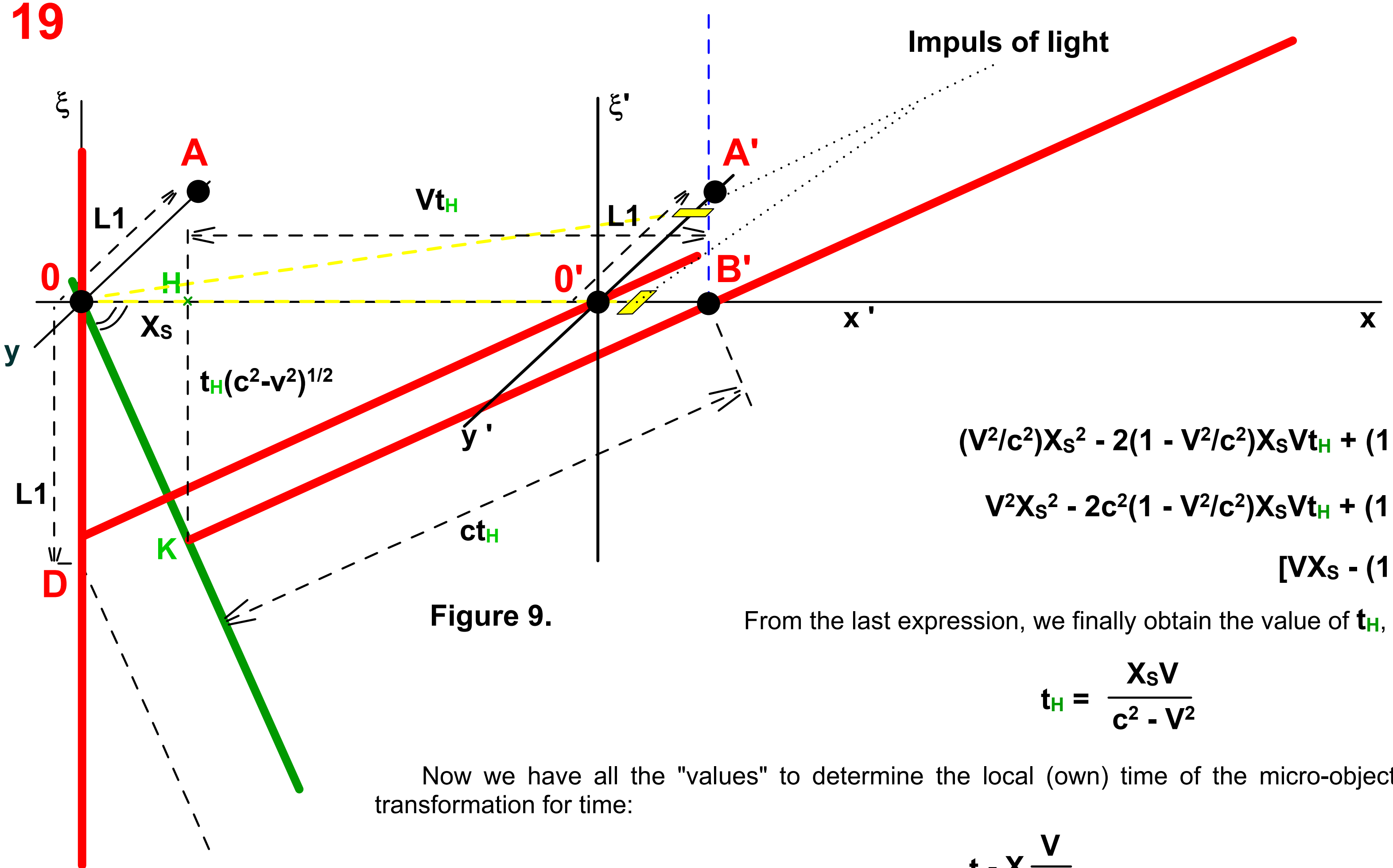


Figure 9.

$$(V^2/c^2)X_S{}^2 - 2(1 - V^2/c^2)X_S V t_H + (1 - V^2/c^2)^2 c^2 t_H{}^2 = 0;$$

$$V^2 X_S{}^2 - 2c^2(1 - V^2/c^2)X_S V t_H + (1 - V^2/c^2)^2 c^4 t_H{}^2 = 0;$$

$$[VX_S - (1 - V^2/c^2)c^2 t_H]^2 = 0;$$

From the last expression, we finally obtain the value of t_H, it is equal to

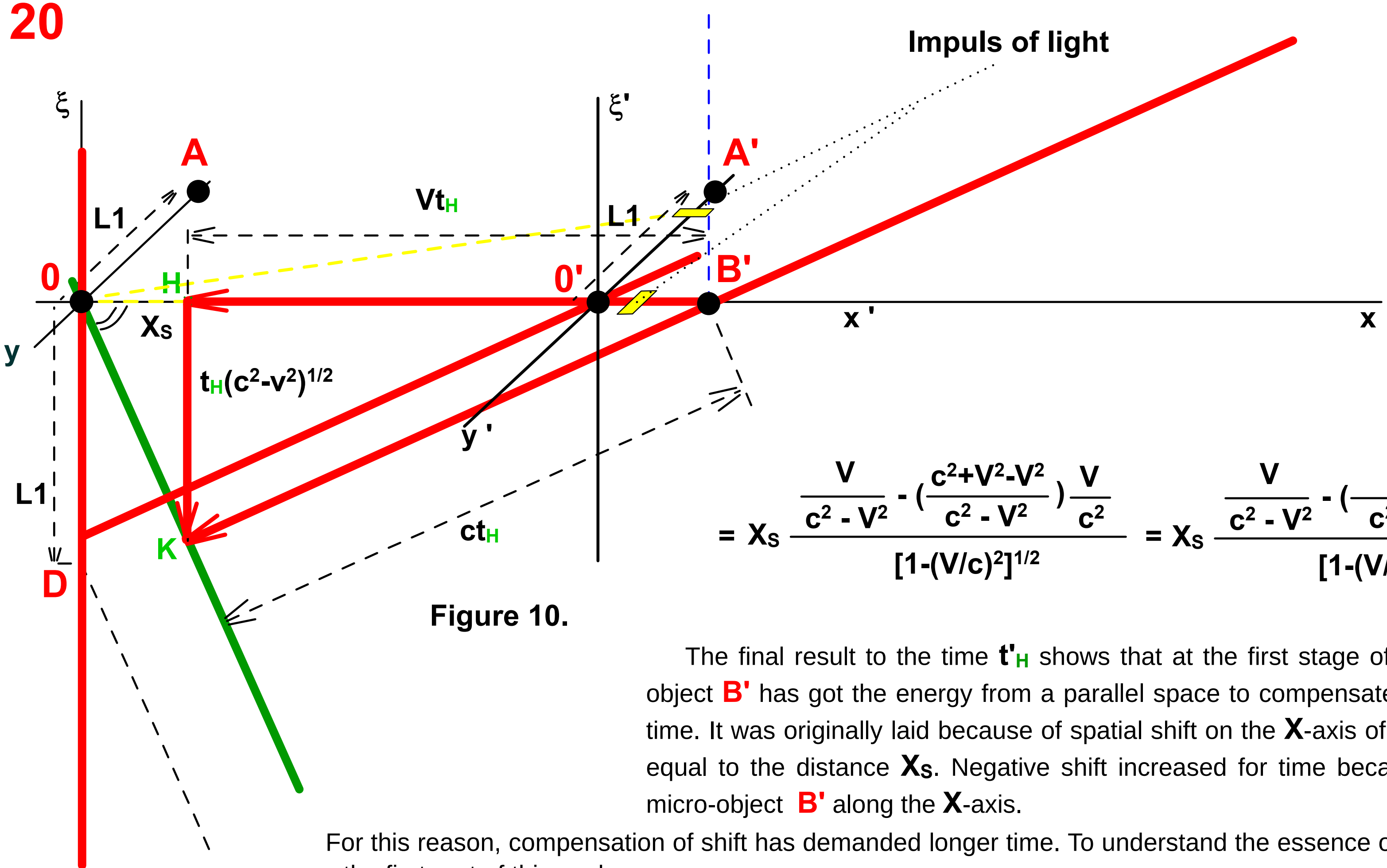
$$t_H = \frac{X_S V}{c^2 - V^2}$$

Now we have all the "values" to determine the local (own) time of the micro-object **B'**, let's use the Lorentz transformation for time:

$$t'_H = \frac{t - X\dfrac{V}{c^2}}{[1-(V/c)^2]^{1/2}}$$

Substituting the value of $t = t_H$ and $X = X_S + Vt_H$ in the Lorentz transformation, we get

$$t'_H = \frac{t_H - (X_S + Vt_H)\dfrac{V}{c^2}}{[1-(V/c)^2]^{1/2}} = \frac{\dfrac{X_S V}{c^2 - V^2} - \left(X_S + V\dfrac{X_S V}{c^2 - V^2}\right)\dfrac{V}{c^2}}{[1-(V/c)^2]^{1/2}} = X_S\,\frac{\dfrac{V}{c^2 - V^2} - \left(1 + \dfrac{V^2}{c^2 - V^2}\right)\dfrac{V}{c^2}}{[1-(V/c)^2]^{1/2}} =$$



$$= X_S \frac{\frac{V}{c^2 - V^2} - \left(\frac{c^2+V^2-V^2}{c^2 - V^2}\right)\frac{V}{c^2}}{[1-(V/c)^2]^{1/2}} = X_S \frac{\frac{V}{c^2 - V^2} - \left(\frac{c^2}{c^2 - V^2}\right)\frac{V}{c^2}}{[1-(V/c)^2]^{1/2}} = 0$$

Figure 10.

The final result to the time t'_H shows that at the first stage of the movement, the micro-object **B'** has got the energy from a parallel space to compensate for the negative bias over time. It was originally laid because of spatial shift on the **X**-axis of the micro-object **B'** that is equal to the distance X_S. Negative shift increased for time because of the movement of a micro-object **B'** along the **X**-axis.

For this reason, compensation of shift has demanded longer time. To understand the essence of the original negative shift, see the first part of this work.

Thus, by the time t_H, own time (local time) of a micro-object **B'** was equal to zero: $t'_H=0$. To again understand the physics of the transfer of energy for the time in geometric form, in detail, see Figure 10. On this figure, overall flow from parallel space is represented by vector **B'K** which splits into two components: the vector **B'H** and the vector **HK**. The first component (vector **B'H**) is a component of the flow, which appears due to the physical movement of a micro-object **B'** in our world. In figure 10, this is represented with help of movement along the **X**-axis.

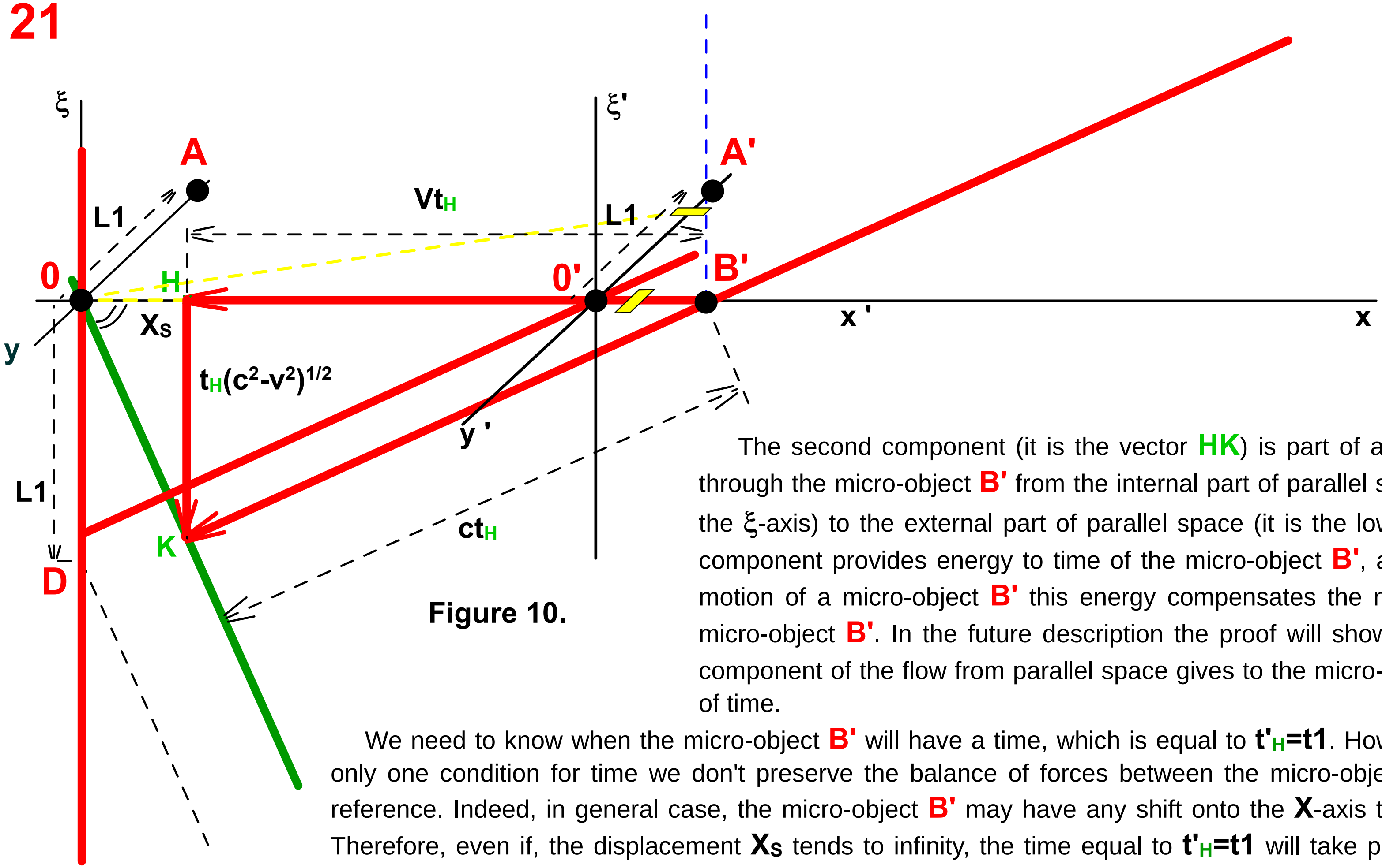


Figure 10.

The second component (it is the vector **HK**) is part of a parallel space that passes through the micro-object **B'** from the internal part of parallel space (it is the upper part of the ξ-axis) to the external part of parallel space (it is the lower part of the ξ-axis). This component provides energy to time of the micro-object **B'**, and during the first stage of motion of a micro-object **B'** this energy compensates the negative shift in time of the micro-object **B'**. In the future description the proof will show, the impact of the second component of the flow from parallel space gives to the micro-object **B'** a positive amount of time.

We need to know when the micro-object **B'** will have a time, which is equal to $\mathbf{t'_H=t1}$. However, if we continue to use only one condition for time we don't preserve the balance of forces between the micro-objects in the moving frame of reference. Indeed, in general case, the micro-object **B'** may have any shift onto the **X**-axis that is equal to $\mathbf{0 \leq X_S < +\infty}$. Therefore, even if, the displacement $\mathbf{X_S}$ tends to infinity, the time equal to $\mathbf{t'_H=t1}$ will take place in the future for micro-object **B'**. But for the balance of forces between the micro-objects in the moving frame of reference it is necessary that the micro-object **B'** is located at a certain distance from the micro-object **0'**. The distance is determined by two factors that need to occur simultaneously: if for the micro-object **B'** time comes $\mathbf{t'_H=t1}$, the light from the micro-object **0'** should reach the micro-object **B'**.

Using these two factors, we proceed to the second stage of analysis. Consider, when a moment $\mathbf{t'_H=t1}$ will take place. Let's analyze it from time $\mathbf{t'_H=0}$ until $\mathbf{t'_H=t1}$. Within this period of the time light from the micro-object **0'** should reach micro-object **B'**. In the example of Figure 5 has already been shown, any micro-object at motion will have the development time that is equal to unit of time when the micro-object receives energy from parallel space that is equal to unit. Unit of energy isn't changed for both the micro-object at rest and for the micro-object at motion. We apply this condition to the transfer of a unit of energy to the micro-object **B'**.

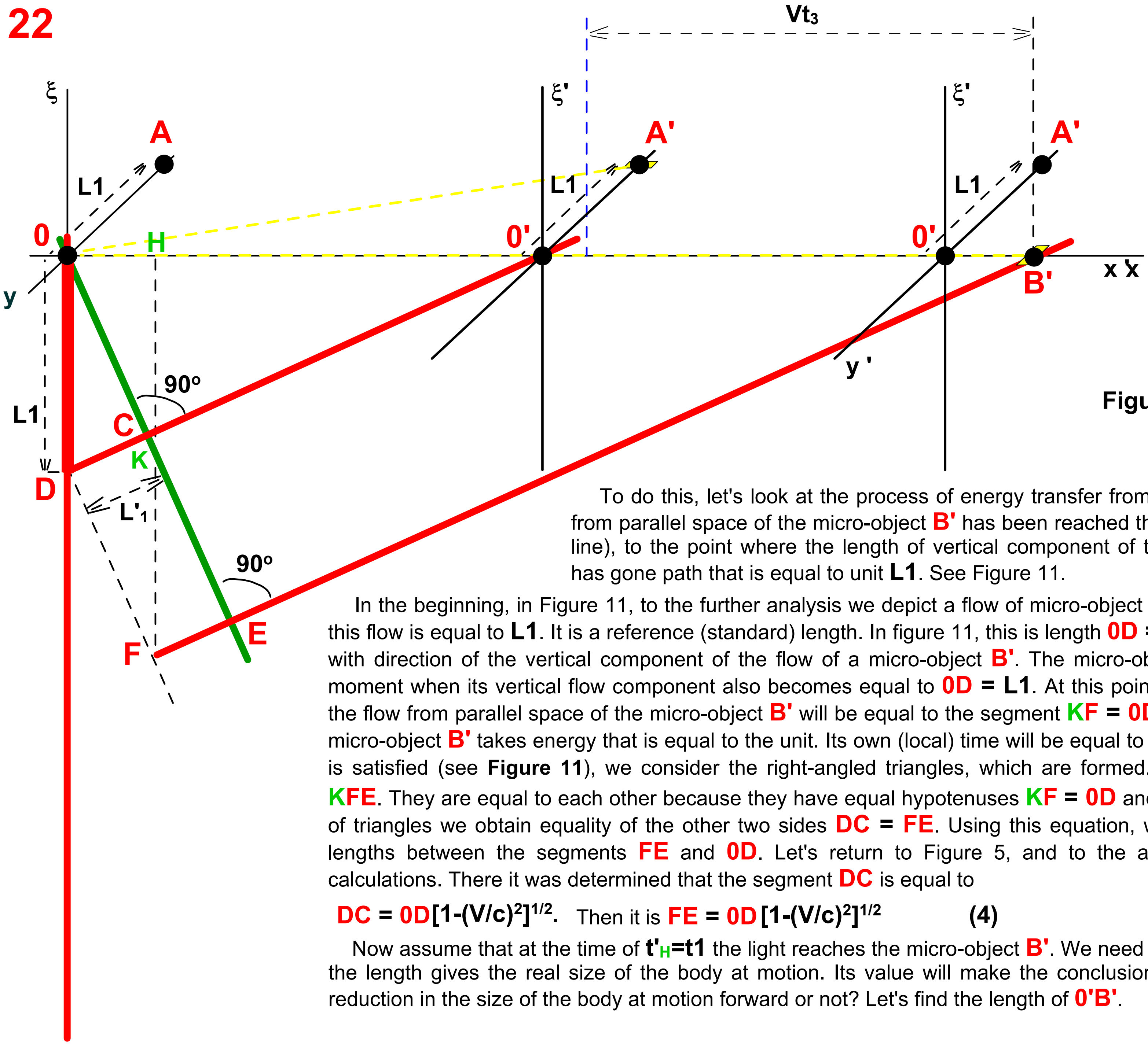


Figure 11.

To do this, let's look at the process of energy transfer from the moment when the flow from parallel space of the micro-object **B'** has been reached the reference level (it's green line), to the point where the length of vertical component of the flow from parallel space has gone path that is equal to unit **L1**. See Figure 11.

In the beginning, in Figure 11, to the further analysis we depict a flow of micro-object (**0**) at rest. Let the length of this flow is equal to **L1**. It is a reference (standard) length. In figure 11, this is length **0D = L1**. Its direction coincides with direction of the vertical component of the flow of a micro-object **B'**. The micro-object **B'** has to move up to moment when its vertical flow component also becomes equal to **0D = L1**. At this point, the vertical component of the flow from parallel space of the micro-object **B'** will be equal to the segment **KF = 0D = L1**, and in this moment micro-object **B'** takes energy that is equal to the unit. Its own (local) time will be equal to $\mathbf{t'_H=t1}$. When this condition is satisfied (see **Figure 11**), we consider the right-angled triangles, which are formed. These are Δ **0DC** and Δ **KFE**. They are equal to each other because they have equal hypotenuses **KF = 0D** and corners. From the equality of triangles we obtain equality of the other two sides **DC = FE**. Using this equation, we define the connection of lengths between the segments **FE** and **0D**. Let's return to Figure 5, and to the accompanying mathematical calculations. There it was determined that the segment **DC** is equal to

$$\mathbf{DC = 0D[1-(V/c)^2]^{1/2}}. \quad \text{Then it is } \mathbf{FE = 0D[1-(V/c)^2]^{1/2}} \qquad \mathbf{(4)}$$

Now assume that at the time of $\mathbf{t'_H=t1}$ the light reaches the micro-object **B'**. We need to find the length of **0'B'**, as the length gives the real size of the body at motion. Its value will make the conclusion whether is there a natural reduction in the size of the body at motion forward or not? Let's find the length of **0'B'**.

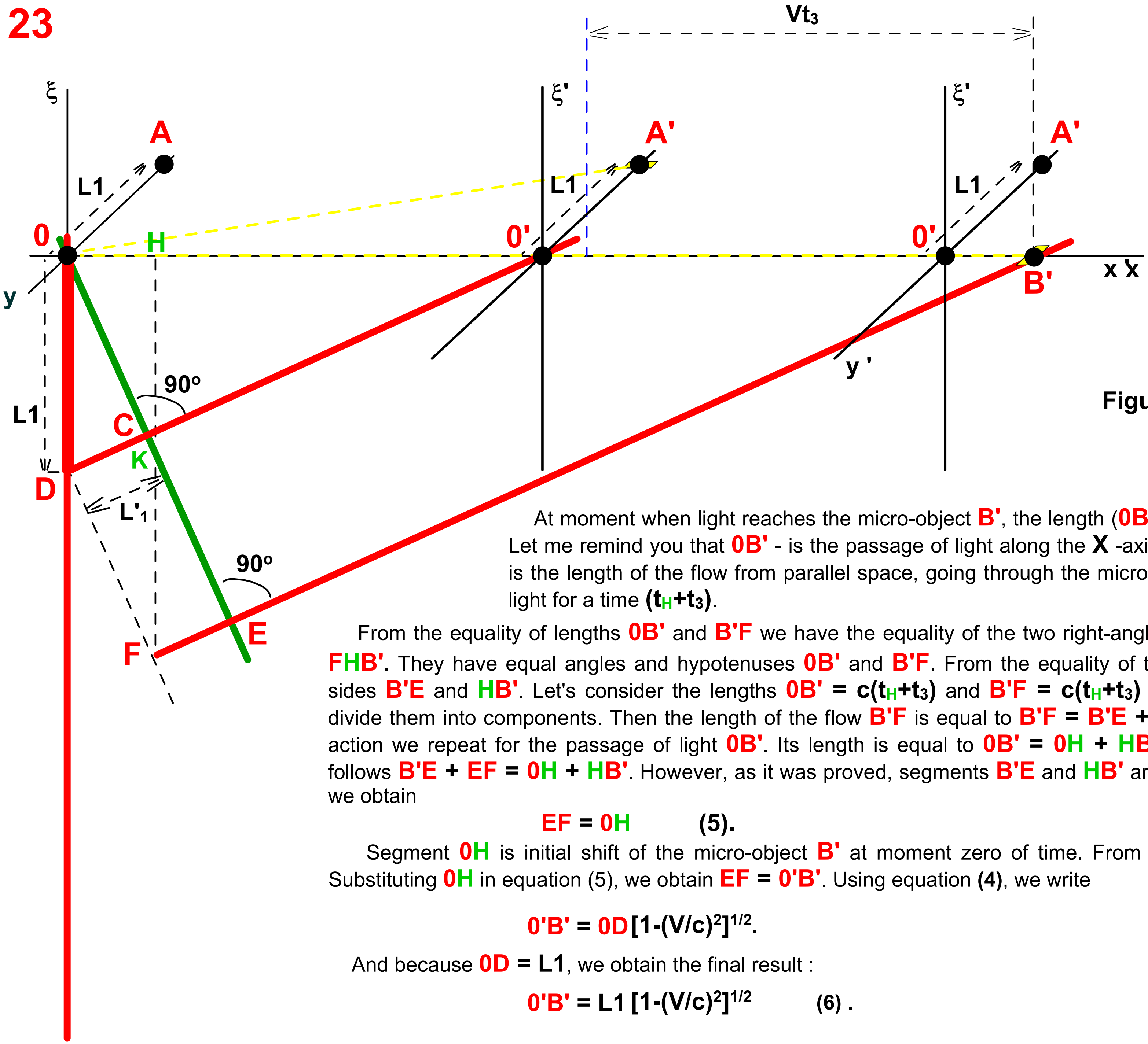


Figure 11.

At moment when light reaches the micro-object **B'**, the length (**0B'**) is **0B' = B'F = c(t_H+t_3)**. Let me remind you that **0B'** - is the passage of light along the **X** -axis for the time **(t_H+t_3)**. **B'F** - is the length of the flow from parallel space, going through the micro-object **B'** with the speed of light for a time **(t_H+t_3)**.

From the equality of lengths **0B'** and **B'F** we have the equality of the two right-angled triangles Δ **0EB'** and Δ **FHB'**. They have equal angles and hypotenuses **0B'** and **B'F**. From the equality of triangles we have the equal sides **B'E** and **HB'**. Let's consider the lengths **0B' = c(t_H+t_3)** and **B'F = c(t_H+t_3)** and for further analysis we divide them into components. Then the length of the flow **B'F** is equal to **B'F = B'E + EF = c(t_H+t_3)**. The same action we repeat for the passage of light **0B'**. Its length is equal to **0B' = 0H + HB' = c(t_H+t_3)**. From here It follows **B'E + EF = 0H + HB'**. However, as it was proved, segments **B'E** and **HB'** are equal to each other. Then we obtain

$$EF = 0H \qquad (5).$$

Segment **0H** is initial shift of the micro-object **B'** at moment zero of time. From here it follows **0H = 0'B'**. Substituting **0H** in equation (5), we obtain **EF = 0'B'**. Using equation **(4)**, we write

$$0'B' = 0D\,[1-(V/c)^2]^{1/2}.$$

And because **0D = L1**, we obtain the final result :

$$0'B' = L1\,[1-(V/c)^2]^{1/2} \qquad (6)\,.$$

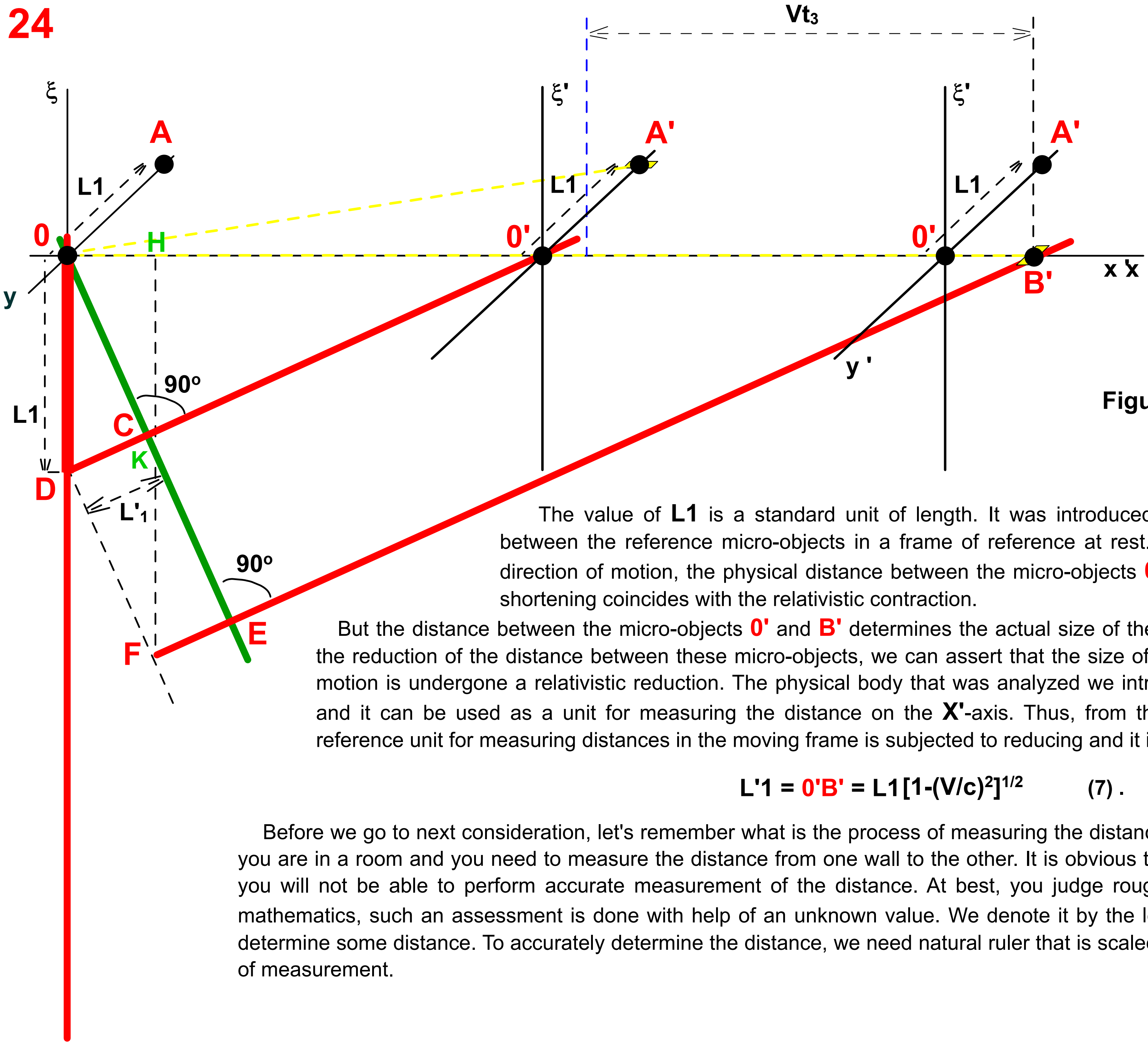


Figure 11.

The value of **L1** is a standard unit of length. It was introduced to determine the distance between the reference micro-objects in a frame of reference at rest. Result (6) says that along direction of motion, the physical distance between the micro-objects **0'** and **B'** is shortened. The shortening coincides with the relativistic contraction.

But the distance between the micro-objects **0'** and **B'** determines the actual size of the physical body. Because of the reduction of the distance between these micro-objects, we can assert that the size of the body in the direction of motion is undergone a relativistic reduction. The physical body that was analyzed we introduced as a standard body and it can be used as a unit for measuring the distance on the **X'**-axis. Thus, from the above it follows that the reference unit for measuring distances in the moving frame is subjected to reducing and it is equal to

$$L'1 = 0'B' = L1[1-(V/c)^2]^{1/2} \qquad (7)\ .$$

Before we go to next consideration, let's remember what is the process of measuring the distance? To do this, imagine that you are in a room and you need to measure the distance from one wall to the other. It is obvious that without the aid of tools, you will not be able to perform accurate measurement of the distance. At best, you judge roughly about the distance. In mathematics, such an assessment is done with help of an unknown value. We denote it by the letter **S**. In this manner, we determine some distance. To accurately determine the distance, we need natural ruler that is scaled with using a standard unit of measurement.

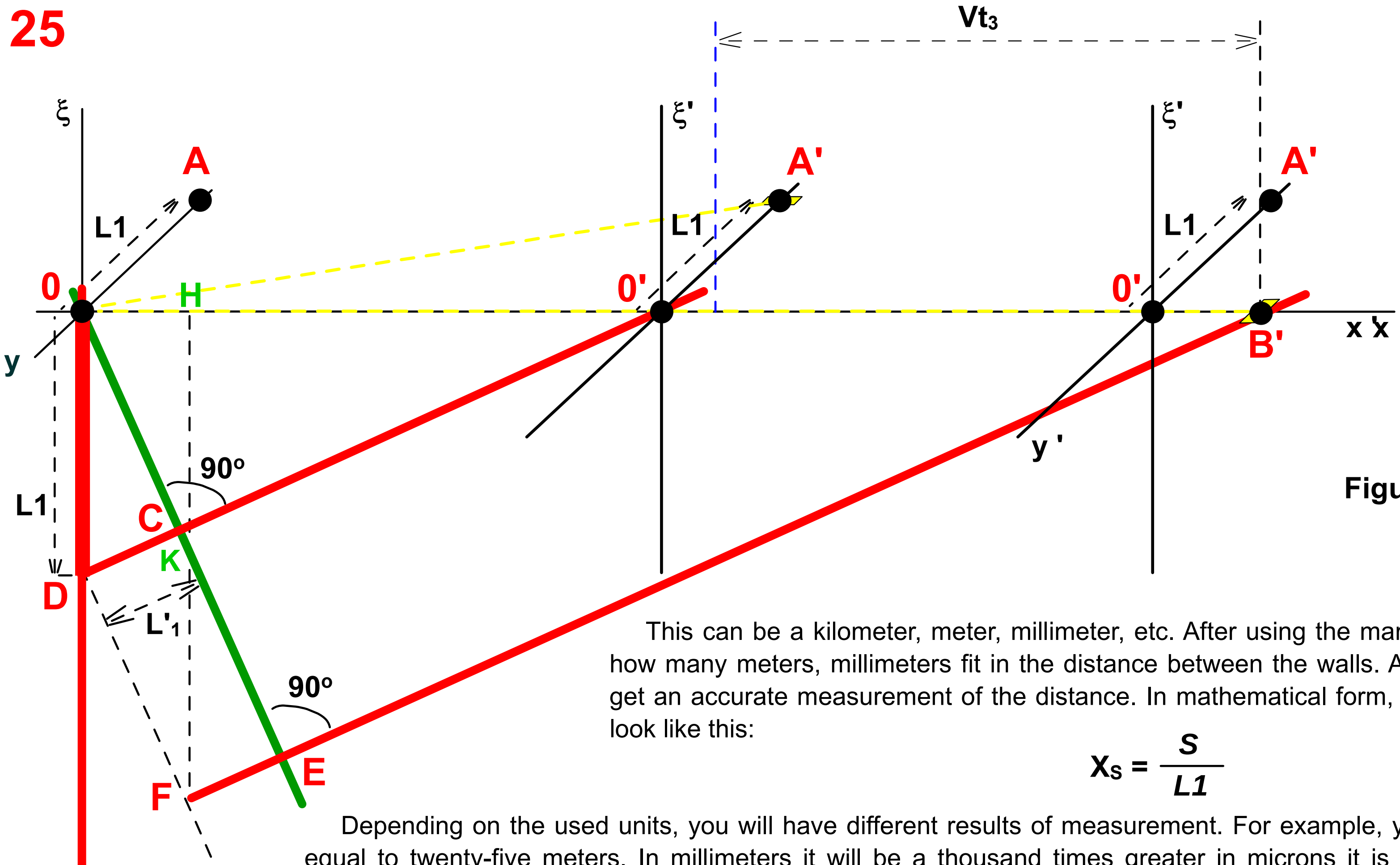


Figure 11.

This can be a kilometer, meter, millimeter, etc. After using the marking of ruler, you can count how many meters, millimeters fit in the distance between the walls. After the calculation, you will get an accurate measurement of the distance. In mathematical form, the measurement result will look like this:

$$X_S = \frac{S}{L1}$$

Depending on the used units, you will have different results of measurement. For example, you got measurement that is equal to twenty-five meters. In millimeters it will be a thousand times greater in microns it is else more. Therefore, if the distances are measured in different parts of the room, for the correct evaluation of the results and in order to compare them with each other you have to use the same ruler and unit of measurement. For this unit of measurement we must have a standard sample of material body. With help of the sample, we can execute measurements inside any frames of reference. And if you have been subjected to acceleration and after, you failed to notice changes in the physical state of the ruler (body) then for the measurement conditions the requirements must not be changed, too. Ruler and unit of measure must be the same. For this reason, in the analysis that has performed, in both frames of reference we had used the same metric cubes.

Now let's go back to our two frames of reference. We take in reference frame at rest a fixed point **X**. Then, if you are located in the center of the moving frame of reference, during time **t** you watch shortening of the distance to the point **X**. Point **X** will approach to the center, where you are located. At any given time, an absolute distance to the point is not dependent on the frame of reference that you have. This distance is accessory of the space and it is linear and homogeneous for whole the considered mathematical analysis here.

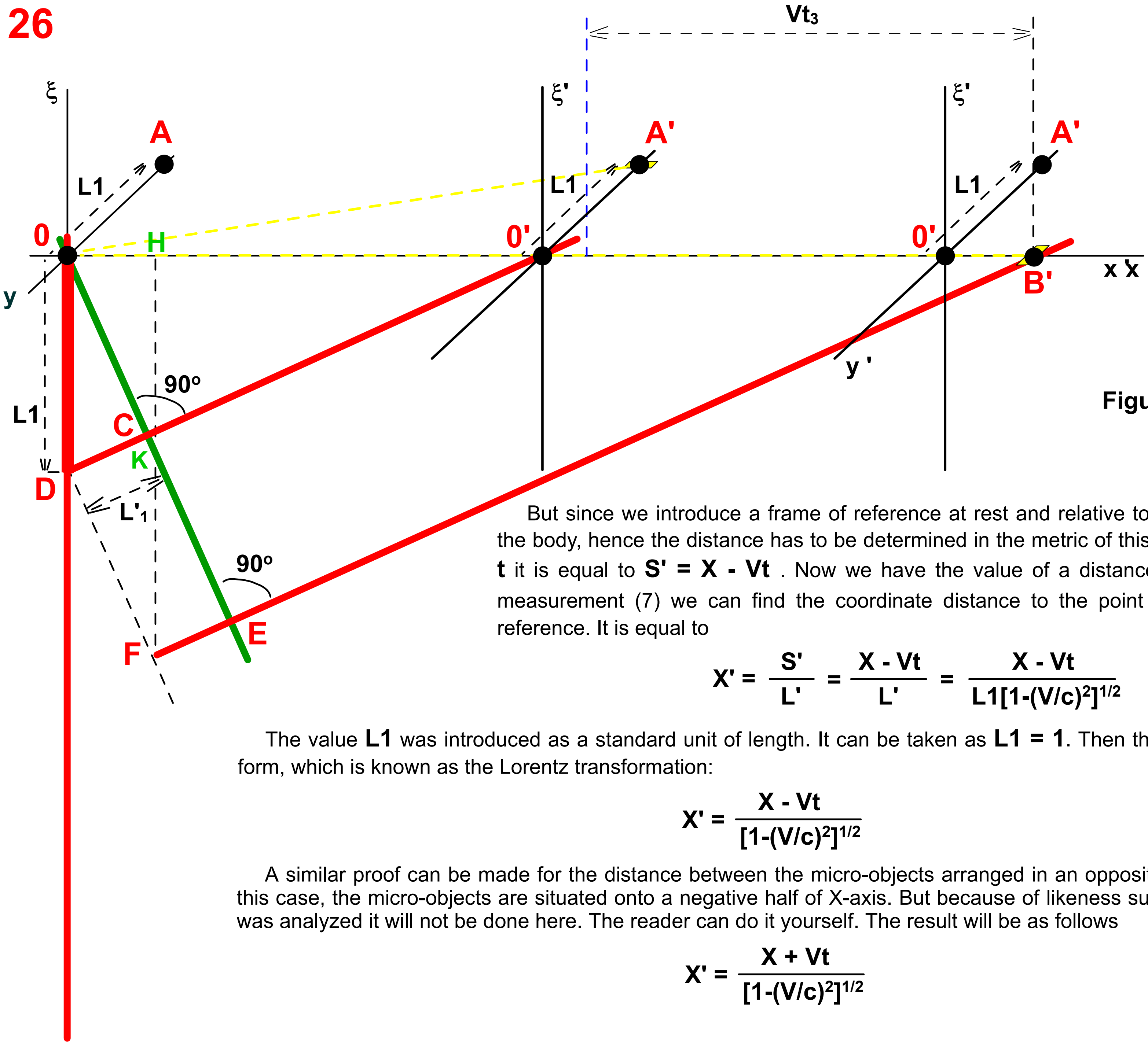


Figure 11.

But since we introduce a frame of reference at rest and relative to it we consider reduction of the body, hence the distance has to be determined in the metric of this frame of reference. At time **t** it is equal to **S' = X - Vt** . Now we have the value of a distance **S'** and the metric unit of measurement (7) we can find the coordinate distance to the point **X** in the moving frame of reference. It is equal to

$$X' = \frac{S'}{L'} = \frac{X - Vt}{L'} = \frac{X - Vt}{L1[1-(V/c)^2]^{1/2}}$$

The value **L1** was introduced as a standard unit of length. It can be taken as **L1 = 1**. Then the result takes a well-known form, which is known as the Lorentz transformation:

$$X' = \frac{X - Vt}{[1-(V/c)^2]^{1/2}}$$

A similar proof can be made for the distance between the micro-objects arranged in an opposite side of the movement. In this case, the micro-objects are situated onto a negative half of X-axis. But because of likeness such proof to the proof, which was analyzed it will not be done here. The reader can do it yourself. The result will be as follows

$$X' = \frac{X + Vt}{[1-(V/c)^2]^{1/2}}$$

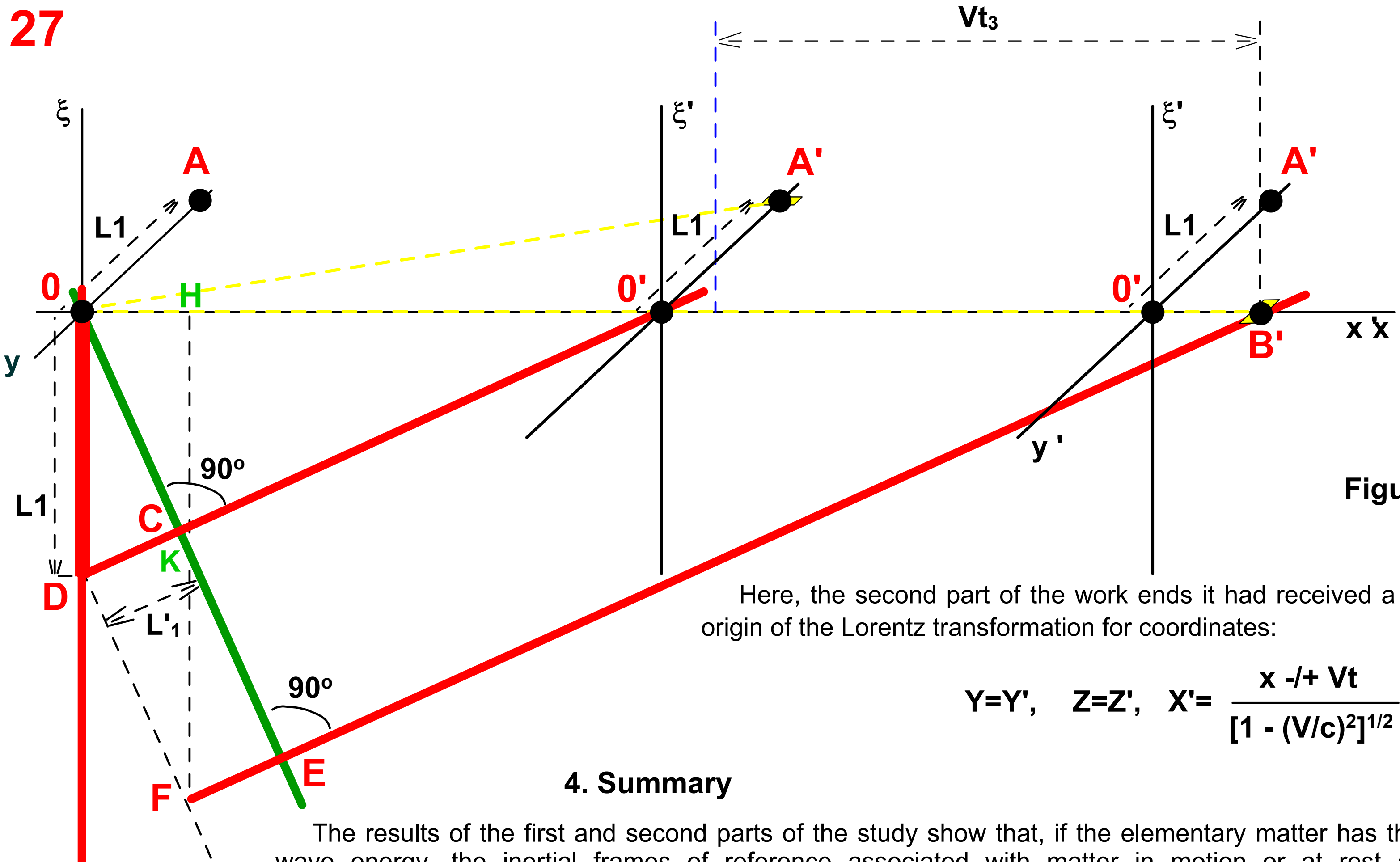


Figure 11.

Here, the second part of the work ends it had received a physical explanation for the origin of the Lorentz transformation for coordinates:

$$Y=Y', \quad Z=Z', \quad X'= \frac{x -/+ Vt}{[1 - (V/c)^2]^{1/2}}$$

4. Summary

The results of the first and second parts of the study show that, if the elementary matter has the properties of the focus of wave energy, the inertial frames of reference associated with matter in motion or at rest are subject to the Lorentz transformations.

In such moving frames of reference, physics experiments that are similar to the experiments of Michelson - Morley will not show the change in the speed of light. The physical processes that give negative results of such experiments are described in detail in the classical literature, and aren't described here again.

Opposite results to experiments of Michelson - Morley are possible for systems of material bodies, where these bodies lose the wave properties of the energy focus. One sign of the loss of such properties - is the lack of reaction forces during acceleration of material objects. For neutral bodies it is the loss of masses (loss of properties in order to transfer the momentum). For these objects, we should not be observed interaction with other masses. The first candidate for such bodies is the neutrino. For the material bodies that have an electric charge it is the lack of properties an electromagnetic force to counteract the acceleration. Is there a candidate for such bodies in the microcosm? I didn't study this question. May be, experts on the structures of the micro particles are able to give answer to this question.

In order that we make sure that this physical model is not contrary to the principle of relativity, it remains to show that all inertial reference frames have properties of relativity to each other.

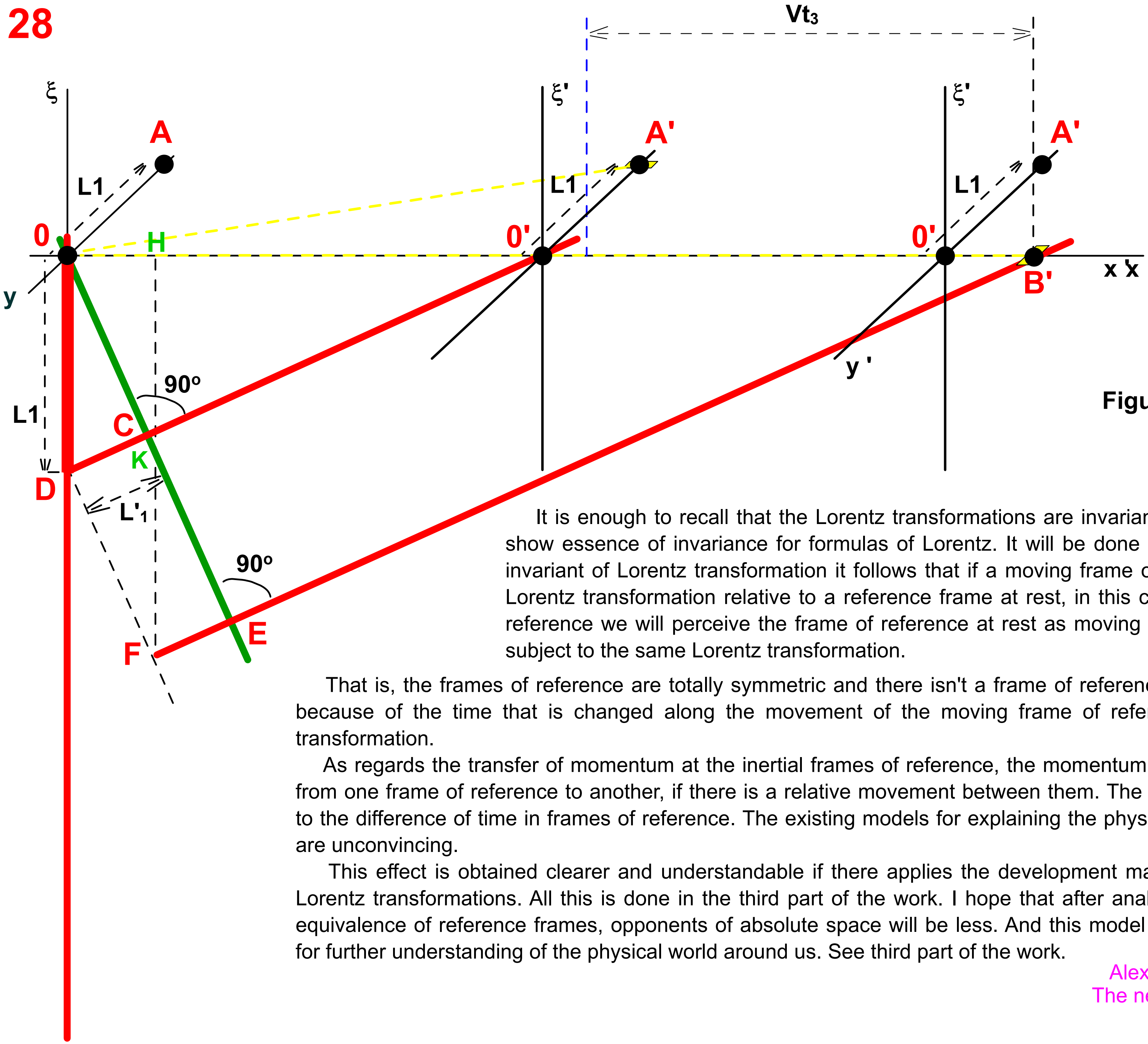


Figure 11.

It is enough to recall that the Lorentz transformations are invariant. Third part of the work will show essence of invariance for formulas of Lorentz. It will be done in brief form. And out of the invariant of Lorentz transformation it follows that if a moving frame of reference is subject to the Lorentz transformation relative to a reference frame at rest, in this case, out of moving frame of reference we will perceive the frame of reference at rest as moving frame of reference, which is subject to the same Lorentz transformation.

That is, the frames of reference are totally symmetric and there isn't a frame of reference at rest. This effect arises because of the time that is changed along the movement of the moving frame of reference according to Lorentz transformation.

As regards the transfer of momentum at the inertial frames of reference, the momentum is changed in the transition from one frame of reference to another, if there is a relative movement between them. The momentum is changing due to the difference of time in frames of reference. The existing models for explaining the physics of change of momentum are unconvincing.

This effect is obtained clearer and understandable if there applies the development mathematical formulas for the Lorentz transformations. All this is done in the third part of the work. I hope that after analyzing the conditions for the equivalence of reference frames, opponents of absolute space will be less. And this model will be accepted as a basis for further understanding of the physical world around us. See third part of the work.

Alexander Poshelaev.

The next part will be continued.