Relativistic mechanics in the 4D-medium model

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The Lagrange function of the whirl is determined in the model of the four-dimensional medium. It has the same form as the Lagrange function of the free particle in the special theory of relativity.

As it was shown [1], the vortex in the 4D medium may be the model of the fundamental particle. On the visible border of the medium, in the three-dimensional space the tilt of the vortex is correspond to the visible velocity of the vortex V

$$V = c \sin \alpha \tag{1}$$

where c is the speed of the light.

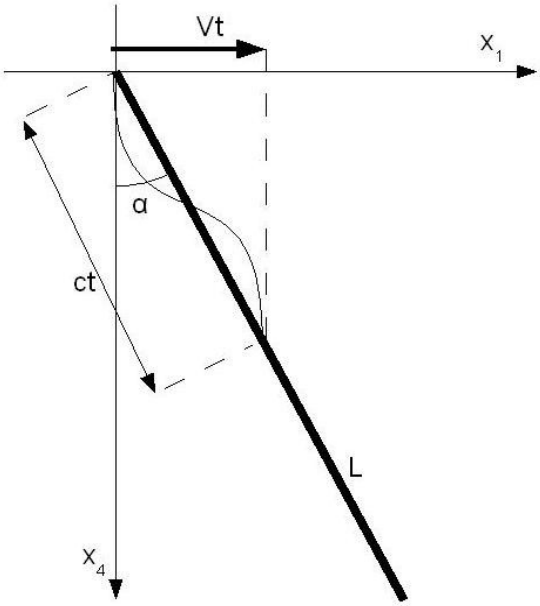

Fig.1.

All this can be treated as so that the light wave is running along the vortex and the projection of that wave velocity on the border is correspond to the velocity of the vortex movement (Fig.1). The mass of the fundamental particle in the model is proportional to the kinetic energy of the medium forming the vortex and therefore is proportional to the vortex length. If m_0 is the mass of the rest vortex, the mass of the moving particle will be enlarged due to the tilt and will be equal to

$$m = \frac{m_0}{\cos \alpha} \tag{2}$$

It is supposed here that the end of the vortex situated at the rather big distance from the border in the bulk of the medium stays unmoved.

The above expressions let to determined the momentum of the vortex as

$$p = m_0 c \, tg \, \alpha \tag{3}$$

As it was shown [1], the energy of the rest vortex E_0 in the proper choosing of the units is equal to

$$E_0 = m_0 c^2 \quad , \tag{4}$$

and the energy of the moving vortex is derived to be equal to

$$E = mc^2 \quad . \tag{5}$$

The classic expressions for the energy may be obtained from it
$E = m_0 c^2 + m_0 V^2/2 = m_0 c^2 + p^2/2\,m_0$

It is easy to get the well-known expression for the squared energy

$$E^2 = m_0^2 c^4 + p^2 c^2 \quad , \tag{6}$$

which in the essence is the result of the Pythagorean theorem under consideration of the triangle at the Fig.1.

To cause the impulse change it needs the force to be applied with the value dependent whether its direction is coincided or not with the direction of motion. In the former case with the help of eq. (3) the time derivative of the momentum is determined as

$$\dot{p} = \frac{m_0 c^2}{\cos^2\alpha}\,\dot{\alpha} = \frac{m_0 c}{\cos^3\alpha}\,\dot{v} \tag{7}$$

Q. (1) used at the last equal sign. In the latter case the value of the angle α does not change and therefore

$$\dot{p} = m_0 c \tan\alpha\,\dot{v}$$

As it is known from mechanics the Lagrange function may be represented as

$$L = pV - E \tag{8}$$

Substituting here values from eds. (1),(3) and (4) we get

$$L = -m_0 c^2 \cos\alpha \tag{9}$$

The expression has the same form as the Lagrange function for free particle in the special theory of Relativity if to use the determination (1):

$$L = -m_0 c^2 \sqrt{1 - \frac{V^2}{c^2}} \quad . \tag{10}$$

Certainly, eq.(9) is not accurate because it set aside the surface effects existing at the vortex outing on the border hyper surface of the medium and obviously playing a great role in the vortex dynamics. Therefore it must be considered as an approximation of such scale as the special theory of the Relativity in the motion description of the materiel point. However, as it has been shown in the previous works, in the distinction of the latter there is no need to use the time by other way as it is using in the classic physics.

Really, the effect of the time delay which obtained in the special theory of the Relativity allegedly observed e.g. in the experiments with cosmic particles. But in these experiments it was told about the life-time of the particles that in our opinion is motion velocity dependent. Really, the particle's mass and hence the length of the vortex are enlarging at the motion. Therefore the particle's life-time is enlarging as well. And therefore these experiments does nothing with the changing of so called «proper» time in the

reference frame connected with the particle.

So the relativistic mechanics can be described on the simple geometrical language without the introduction of the notion of the interval which is used in the theory of the relativity while the expression (10) is being obtained. Although in the frame of the model of the 4D-medium there were derived the relations with the form coincided with the Lorentz transformation [2], the treatment of the latter doesn't suggest the real effects of the length contraction and time delay in the moving reference frame.

[1] V.Skorobogatov. About the mass in the model of 4D-eather. article7a.html 2007
[2] V.Skorobogatov. The reference frames in 4D-model of aether (in Russian). vps137.narod.ru/article6.html , 2006