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The influence of the compressibility of the gaseous dark matter at the interaction of bodies and a gaseous dark matter. Mass of rest and motion

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Abstract

The paper investigates the physical meaning of Lorentz correction, which was laid the basis for the theory of relativity. It is shown that in the perception of the presence in the space between the baryon bodies a gaseous dark matter, this amendment takes into account the property of a compressibility of gases.

In Newtonian mechanics, the mass is considered by a constant. Later it turned that it is out to be incompatible with the requirement of invariance of the equations with respect to the Lorentz transformations used in the theory of relativity Einstein. Therefore, it was assumed that the mass of the body depends on the velocity of the body relative to the frame of reference in which the mass is measured. The result was, that if the two reference systems is moving with velocity V relative to one another, then to create the same acceleration dV / dt of the body need to apply different forces. From here the mass m, as measured in the system with respect to which it moves, more than mass mo in system in which it rests. The relationship between these masses is determined by the formula

$$m = \frac{m_o}{\sqrt{1 - \frac{V^2}{C^2}}}. \qquad (1)$$

Than the velocity is greater of the body,its mass is the greater. When the velocity V seeks to the speed of light in vacuum, mass becomes infinite. Since the forces are finite, then the speed of light in a vacuum is a limiting value, which can not be achieved, let alone in order to outdo. Mass m, defined by the formula (1), in the theory of relativity is called by the transverse mass. Apart from it there is longitudinal mass

$$m = \frac{m_o}{\sqrt[2]{(1 - \frac{V^2}{C^2})^3}}. \qquad (2)$$

It used, when a force acts in the direction of movement. In this section of the masses on the longitudinal and transverse there is a something strange. Why a longitudinal mass is not included in the theorem of pulses, Which is applied to the study of accelerated translational motions of bodies, and includes in itself a transverse mass? The theorem of momentum to theory of relativity in the light of the above has the form

$$\frac{d}{dt}\left(\frac{m_o}{\sqrt{1-\frac{V^2}{C^2}}}\vec{V}\right) = \vec{F}\ . \qquad (3)$$

From these formulas it follows that significant differences in the values of m and m_o become visible only at very high speed V, approaching the speed of light in vacuum. These formulas were used in the study of the motion of the electrons emitted by radioactive elements, as well as during acceleration and deflection of a beam of electrons in the betatron, the synchrotron and other devices.

Although an experimental verification of the motion of electrons in a transverse electric field confirmed the formula (3), it can not be considered comprehensive. It is impossible not to notice that no one really not measured the mass of an electron at near-light speeds. No wonder, the thoughts about the possibility to extend this ideas for the weight mass very much was tormented by Einstein. Direct a verification is hardly feasible due to technical the difficulties. In the meantime, we state that **in the experimentally was measured not a mass, but the force which is need for the acceleration or the deflection of the moving electron in the system related to the earth. The only indisputable is therefore was the observed increase this power at speeds close to the speed of light.**

Assessing this the conclusion, we recall that in human a practice there are many a cases, when the evolutionary change of the operating modes of a facility or the occurrence of a phenomenon there are additional the factors that modify the quantitative indicators of these facilities or events. Moreover, these factors are not always visible. We need to be able to detect its. In the theory of relativity prudently was imposed a ban on the identification of the additional factors. This is achieved by introducing a postulate of the constancy of the speed of light in vacuum, and the refusal from the intervening medium between bodies. Therefore, to deny or to change anything in this theory from the standpoint of the theory itself is impossible. Hard mathematical apparatus always leads to the same known conclusions.

Let's try to address this problem by abandoning from the two prohibitions of the relativity. We assume that the universe is filled with a dark matter. Dark matter is in a gaseous state. Baryon bodies down to the elementary particles there are in the ocean of dark matter. In [1,2,3] the properties of a dark gaseous matter (dark gas) have been investigated, found the main parameters of the environment. In this case we are dealing with the physics of gases. The Mathematics plays a supporting serving and does not restrict the role of the research.

If to think about the logic of Einstein, one can easily imagine how a theoretical physicist in his mind compares the relative motion of different bodies, whatever their number was and how far apart they there are. **However, it is difficult to understand how the nature determined and tracks that with respect to what moves and in which system at a given time the calculating mass was produced. Let us to look more real cause of the increase in force immediately surrounding the moving body. And there is such a reason.**

The kind of (1), (3) suggests that the amendment Lorentz $1/\sqrt{1-\frac{V^2}{C^2}}$ for the force is due by the influence of the compressibility of a dark gas, rather than relative motion in different frames of reference. The electrons and other elementary particles are very dense bodies of the universe. Therefore the flows of dark gas around these bodies similar to the air flows around a soccer ball, or a meteorite. Consequently, the streams of dark gas about flying electron can be described by the Laplace equation for an incompressible fluid, if the speed $V \ll C_{ao}$

$$\partial^2\varphi/\partial x^2+\partial^2\varphi/\partial y^2+\partial^2\varphi/\partial z^2=0. \qquad (4)$$

Here C_{ao} is the velocity of a propagation weak perturbations. In [1.2], it was shown that in the quiescent gas dark C_{ao} = C=300000 km / s

We consider the converted motion. This is the usual technique in a gas dynamics. In this formulation, not an electron moves with velocity V through a quiet dark gas, but rather on a stationary electron with velocity V the flow of dark gas is incident.

It is known that the compressibility of a gas is manifested at higher speeds. This is reflected in the fact that the effect of any a perturbation source to a remote point is delayed compared to the same action in an incompressible medium. In an incompressible medium it is transmitted instantly. If the speed of the irrotational compressible flow of a dark gaseous matter is approaching to the speed of Cao and therefore to the speed of light in vacuum in the linear formulation is described by the equation

$$(1-M^2)\partial^2\varphi/\partial x^2+\partial^2\varphi/\partial y^2+\partial^2\varphi/\partial z^2=0. \qquad (5)$$

In this equation, the number M represents the ratio of a speed to the speed of a propagation of a small perturbations in the gaseous medium. Applied to the dark gas $M=V/Cao=V/C$. Here Cao □C is a velocity of a propagation of a small perturbations in a quiet dark gas. The transformation of coordinates of the form

$$x=\left(\sqrt{1-M^2}\right)\cdot x_H\,;y=y_H\,;z=z_H\,. \qquad (6)$$

The equation (5) for an arbitrary number M <1 reduces to equation (4) for the number of M = 0. The potential of a velocity φ in both cases is the same. The velosity of the body (electron) is directed along the OX-axis. Formulas (6) indicates that the transition from incompressible medium on a compressible medium, dimensions of the bodies in a direction transverse to the direction of motion is unaffected. The dimensions in the direction of motion along the x-axis are reduced compared with the same dimensions along the $OX_н$ in an incompressible medium in accordance with the formula of the Lorentz – Fitzgerald

$$l=\left(\sqrt{1-M^2}\right)\cdot l_H\,.$$

There is no need to understand this as the physical reduction resize bodies. In really the properties of a flow of a dark gas around the body was being changed due to the manifestation of a compressibility. The formula (6) only formally mathematically is interprets this phenomenon as a change in the length of their bodies in the direction of motion. In aerodynamics so successfully the aerodynamic characteristics of the wing in an incompressible flow at M = 0 was translated in to their characteristics in compressible flow for all numbers M <1.

Corresponding changes occur not only with linear dimensions, but also with the local flow velocity. Indeed, we differentiate the velocity potential in the coordinates X, Y, Z in a compressible flow and, passing to the coordinates $X_н,У_н,Z_н$ in an incompressible flow, we have

$$\frac{\partial\varphi}{\partial x}=\frac{1}{\sqrt{1-M^2}}\frac{\partial\varphi}{\partial x_H};\;\;\frac{\partial\varphi}{\partial y}=\frac{\partial\varphi}{\partial y_H};\;\;\;\frac{\partial\varphi}{\partial z}=\frac{\partial\varphi}{\partial z_H}. \qquad (7)$$

Given that the first derivatives of the velocity potential for both incompressible and compressible medium equal to the corresponding component of the velocity of the disturbed flow we replace (7) to the relevant equality

$$V'_x=\frac{V'_{xH}}{\sqrt{1-M^2}},V'_y=V'_{yH},V'_z=V'_{zH}. \qquad (8)$$

These equations give the relation between the velocities of the perturbed flow around a streamlined body, such as an electron, in a compressible and incompressible flows in all relevant points related equations (6). The perturbed speeds of a flow V′ and $V'_н$ are absolute a velocities of flow of a dark gas relative a field of calm dark gas in the coordinate system associated with the body (electron). It is moving with him at a velocity V.

In this regard, we note that equation (6) and (8) is reveal the essence of real physical phenomena occurring in a compressible dark gas about a moving electron (the body). In the theory of a gaseous dark matter a correction of Lorentz $1/(1-M^2)^{1/2}$ is full by physical sense, because it takes into the account of the influence of the compressibility of a dark gas. In a gas dynamics, it is known as the Prandtl correction for compressibility of an air. The speed of propagation of a small perturbations in the dark gas and any other gas does not depend from an own velocity of a source perturbations. It is this property in a relativity theory without an evidence is transferred to the speed of light and was entered as an indisputable postulate. In the theory of relativity, the Lorentz correction $1/(1-M^2)^{1/2}$ is explained by a relative motion.

From relations (8) one can see that at all points of a compressible flow at M> 0 the absolute speed of a dark gas in the direction of the x-axis (the direction of motion of the body) in $1/(1-M^2)^{1/2}$ times more than the speed in the corresponding points of an incompressible stream at M = 0. The same changes will occur in the compressible flow around the body, if instead of taking into account the effects of compressibility, formally we increase the speed of the incoming flow of $1/(1-M^2)^{1/2}$ times. That is, we assume that the velocity of the incoming flow is

$$V = \frac{V_H}{\sqrt{1-M^2}}.$$

In the forward movement when the body (electron) moves through quiet dark gas from where the velocity V and $V_н$ are the speed of this body in compressible and incompressible flows. In this case, the theorem of pulses can be written in the form

$$\frac{d}{dt}\left(m_o\vec{V}\right) = \frac{d}{dt}\left(m_o \frac{\vec{V}_H}{\sqrt{1-M^2}}\right) = \vec{F}. \qquad (9)$$

Here, as in Newtonian mechanics weight mo is constant. Therefore the speed, the acceleration and, consequently, the force F dependent from the correction for the dark gas $1/(1-M^2)^{1/2}$.

Next, we shall follow the logic of the theory of relativity and shall assume that for any velocity of the body, such as an electron, to give it the same acceleration dV/dt and $dV_н/dt$ in a compressible and a incompressible flows, it is necessary to attach to it a various forces. In such circumstances, in equation (9) the amendment $1/(1-M^2)^{1/2}$ formal is moves from the speed on body weight. As a result of this a mass ceases to be a constant and begins to depend on the velocity of the body relative a calm dark gas. On the contrary, the velocity and the acceleration of compressible and incompressible flows a dark gas equal to each other:

$V=V_н$, $dV/dt=dV_н/dt$.

As a result, the mass becomes a meaningful mass of a movement m at a speed V and the rest mass mo at zero speed. Between them, as follows from (9), formally a connection is establishs

$$m=m_o/\sqrt{1-V^2/C^2} \qquad (10)$$

Here V - velocity of the body relatively quiet dark gas. With this understanding of mass the theorem of momentum (9) takes the form, as in the theory of a relativity:

$$\frac{d}{dt}\left(\frac{m_0}{\sqrt{1-\frac{V^2}{C^2}}}\bar{V}\right) = \vec{F} \qquad (11)$$

From the viewpoint of practical use formula (11) does not differ from the formula (9) and from the formula (3) Einstein's relativity theory. However, the philosophical significance of (9) and (11) changed compared with the formula (3) of the theory of relativity. In aerodynamics known, that the linear theory, which was used in the preparation of (9) and (11), does not give the correct result for M = 1. To do this, we must to use a different theory of aerodynamics, designed for a transonic flows. This theory, although is giving the maximum values of the forces acting on the body in the gas flow at M = 1, but this a force remains finite. The same theory should be applied to the analysis of a transonic (near-light) flows of a dark gas.

Therefore, on the basis of formulas (3) and (11) should not be done a philosophical conclusion about the impossibility of a exceeding the speed of light in a vacuum by material bodies. In this context it is appropriate to recall that appeared a number of publications of astronomical observations that the some space objects have the superluminal velocities. However, still the position of the theory of relativity is so strong that many the relativists treated with suspicion to these messages. Despite the facts, the advocates of this theory try to refute criticism by the basic postulate of relativity that in a nature there are no object which has the velocity more to velocity of a light in vacuum.

It is clear that in the derivation of (11) amendment $1/(1-M^2)^{1/2}$ only formally is transferred from acceleration to the weight. Therefore, about the dependence of mass from velocity can speak rather arbitrary.

Should dwell at one issue which was associated with the acceleration of the electron. During acceleration of the electron at a Mach number greater than the critical Mach number in the flow of gaseous dark matter shock waves is appear before the electron. This phenomenon is accompanied by a wave resistance for to overcome which is need a more power. It is clear that the wave resistance is preventing to the acceleration of electrons in the forward direction, does not affect on the bending of their trajectories. Apparently this is due to the division in the theory of relativity a mass on the longitudinal and transverse. The denominator of the formula (1) has been changed. This turned the formula (1) into the formula (2). Thus it allowed approximately to consider the additional power of the wave resistance. The strength of the wave resistance occurs precisely at the approach of the electron velocity to the speed of light and therefore psychologically was associated with the acceleration of the electron.

In conclusion, we make an assumption about the problem that needs to be explored in the future. If the body reaches to superluminal a velocity in a gaseous dark matter, then in the theorem of pulses should be added the amendment $1/\sqrt{\frac{V}{C}-1}$. This is done in gas dynamics in the study of the motion of bodies in the air.

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