Phenomenon the kinetic energy and the inertia material of the bodies

F. F. Mende

http://fmnauka.narod.ru/works.html mende_fedor@mail.ru

Abstract

In the article is examined physical nature of the inertia of material tel.

Good is known, that for the acceleration material the bodies it is necessary to spend energy, for what to by it is necessary to apply the force. Executed the work passes into kinetic energy the motion. With braking the body returns this energy to the surrounding bodies, for what they be required the forces, reverse that, which the body accelerated. This is the phenomenon the inertia.

Is clear, that the process the acceleration accumulates into the body what form of energy, which and returns then to external medium with its braking. But not one of existing into present the time the theories not gives the answer to a question, that this for energy and by what by the means it is accumulated and it returns. Charged the bodies and the charges are had electrical the field, possessing energy. It is possible it was to expect, that the dependence of these pour on from the speed it could spill the light to this a question. In the special the theory of the relativity (STR) electrical

the field of the charges depend from the speed, and, it would seem, this of the theory it must was give the answer to this interesting a question. But into STR the charge is the invariant of the speed.

Into the works [1-3], is shown, that into the framework of the Galilean transformations scalar the potential of the charge depends from his the relative speed. With this electrical the field, normal to the direction its the motion, increase, into of the of the time as longitudinal the field remain constant. Similar the approach gives the possibility to explain and the phenomenon of the kinetic energy and the phenomenon the inertia.

The electron has electrical the field, energy which of easy to calculate. Specific energy electrical pour on it is written as

$$w = \frac{1}{2}\varepsilon E^2 \ .$$

The tension electrical pour on the electron it is determined by the equality

$$E = \frac{e}{4\pi\varepsilon_0 r^2} \ .$$

Using the element the volume $4\pi r^2 dr$, we obtain of energy pour on that being resting the electron:

$$W = \int_a^\infty \frac{e^2 dr}{8\pi\varepsilon_0 r^2} = \frac{e^2}{8\pi\varepsilon_0 a},$$

where e - the charge of the electron, and a - its a radius. If the electron moves from with the speed v, the its electrical the field, normal to the direction the motion according to the concept of scalar-vector potential they increase:

$$E_{\perp} = Ech\frac{v}{c} \approx E\left(1+\frac{1}{2}\frac{v^2}{c^2}\right).$$

Let us write down electrical the field, normal to the direction the motion into to the system the coordinates, that represented in Fig 1.

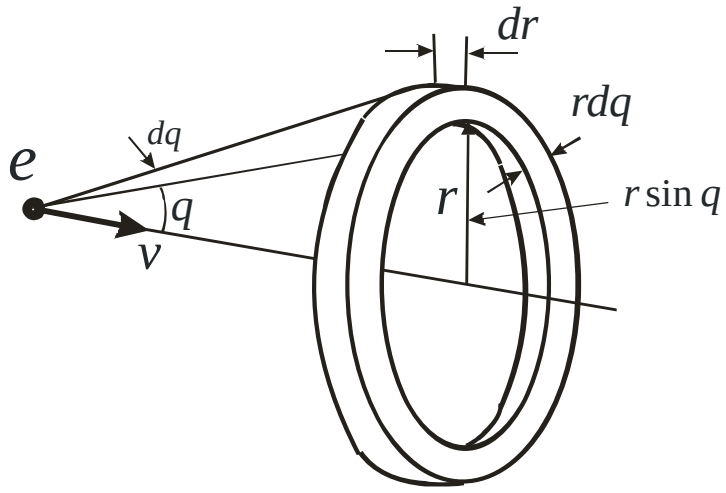

Fig. 1. The element the volume $2\pi r^2 \sin q\ dq\ dr$, utilized for the calculation energy pour on that moving the electron.

$$E_{\perp} = E\left(1+\frac{1}{2}\frac{v^2}{c^2}\right)\sin q$$

Then energy pour on that moving the electron it will be written down

$$W_v = \left(1+\frac{1}{2}\frac{v^2}{c^2}\right)^2 \int \frac{e^2 \sin^3 q\ dqdr}{8\pi\varepsilon_0 r^2}$$

The integration on to the angle gives

$$\int_0^{\pi} \sin^3 q\ dq = -\int_0^{\pi} (1-\cos^2 q)d(\cos q) = -\cos q + \frac{\cos^3 q}{3} = \frac{4}{3}$$

Therefore

$$W_v = \frac{4}{3}\left(1+\frac{1}{2}\frac{v^2}{c^2}\right)^2 \int_a^\infty \frac{e^2 dr}{8\pi\varepsilon_0 r^2} = \frac{4}{3}\left(1+\frac{v^2}{c^2}+\frac{1}{4}\frac{v^4}{c^4}\right)\frac{e^2}{8\pi\varepsilon_0 a} \ .$$

For the speeds is considerable smaller the speed of the light the term $\frac{1}{4}\frac{v^4}{c^4}$ can be disregarded, therefore

$$W_v = \frac{4}{3}\left(1+\frac{v^2}{c^2}\right)\frac{e^2}{8\pi\varepsilon_0 a}.$$

The connection between by energy pour on and with the mass the rest of the electron it is given by the equality [4]:

$$W = \frac{4}{3}\frac{e^2}{8\pi\varepsilon_0 a} = mc^2 \ .$$

Consequently additional energy the electron, connected from that, that its the field depend on the speed, to be determined by the relationship

$$W_v = mv^2 \ .$$

This and is kinetic energy that moving the electron. It is differed from that conventional the value by the coefficient $\frac{1}{2}$, but this indicates only the, that officially accepted the value the mass the electron it is necessary to decrease into two times.

By such by the means, we established physical the reason for the presence in moving charged the bodies the kinetic energy and consequently and their inertia the properties of. These the property are connected from

with the dependence the scalar the potential charges on their relative the speed.

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