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Phenomenon of Kinetic Energy and Inertia of Material Bodies

By F. F. Mende

Abstract- It is well known that for accelerating the material bodies it is necessary to spend energy, in this case the executed work passes into the kinetic energy. With the braking the body returns this energy to the surrounding bodies, for which required the forces, the reverse facts, which accelerated body. This is the phenomenon of the inertia. However, nature of this phenomenon was up to now not clear. In the article it is shown that the inertia and kinetic energy of material bodies are the consequence of the dependence of the scalar potential of charge on the speed. Are obtained the conversions pour on, which reflect this law.

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I. Introduction

It is well known that for accelerating the material bodies it is necessary to spend energy, in this case the executed work passes into the kinetic energy. With the braking the body returns this energy to the surrounding bodies, for which required the forces, the reverse facts, which accelerated body. This is the phenomenon of the inertia.

It is clear that in the process of acceleration the body accumulates some form of energy, which returns then to the environment with its braking. But none of the existing at present theories gives answer to a question, that this after energy and how it is accumulated and returns. Charged the bodies and in the charges are had the electrical field, possessing of the energy. It is possible to expect that the dependence of these pour on from the speed it can shed light to this question. In the special theory of relativity (SR) the electric fields of charges depend on speed, and, it would seem, this theory had to give answer to the presented question. But into SR the charge is the invariant of the speed. Its fields although change in the process of acceleration, these changes occur in such a way that to an increase pour on normal to the direction of motion it is compensated by the decrease of longitudinal pour on, and the flow of the electric field through the surface, which surrounds charge remains constant.

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In works [1-6] it is shown that within the framework the Galileo conversions the scalar potential of charge depends on speed. In this case the electric fields, normal to the direction of its motion, increase, while longitudinal fields they remain constant. Similar of the approach gives of the possibility to explain of the phenomenon of the kinetic energy and the inertia of the material bodies.

II. Kinetic Energy Of The Electrified Bodies

The electron has the electrical fields, energy which easy to calculate. Specific energy of the electrical fields is written

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

The tension of the electrical fields of the electron 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 the energy of the fields on resting of 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 is the charge, a is radius of the electron. If electron moves with the speed v, then, according to the concept of scalar-vector potential, its electric fields, normal to the direction of motion, increase:

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

Let us write down the electric fields, normal to the direction of motion in the coordinate system, represented in Fig 1.

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

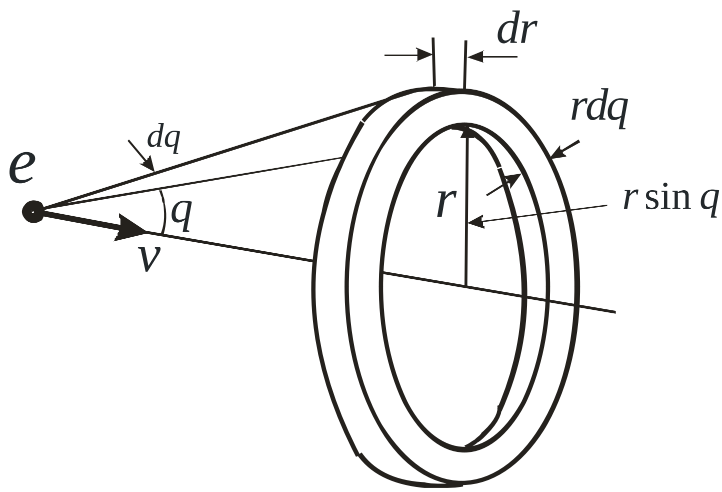

Fig. 1: The element of the volume, utilized for the calculation of the energy fields moving of the electron

Then the energy of the fields moving electron 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 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 of the speeds is considerable smaller of the speed of the light the term $\frac{1}{4}\frac{v^2}{c^2}$ 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 of the fields and with the mass of the rest of the electron is given by the equality [7]:

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

Consequently, additional energy of electron, connected with the fact that of its field they depend on speed, to be determined by the relationship

$$W_v=mv^2$$

This is the kinetic energy moving of the electron. It is differed from the conventional value in terms of the coefficient $\frac{1}{2}$, but this indicates only that the fact that the officially taken value of the mass of electron must be decreased two times.

Thus, we established the physical cause for the presence in the moving electrified bodies of kinetic energy, and, therefore, also their inertia properties. These the property are connected with the dependence of the scalar potential of charges on the speed, and since all material bodies consist of the free or bound charges, this rule is universal.

III. Conclusion

It is well known that for accelerating the material bodies it is necessary to spend energy, in this case the executed work passes into the kinetic energy. With the braking the body returns this energy to the surrounding bodies, for which be required the forces, the reverse facts, which accelerated body. This is the phenomenon of the inertia. However, nature of this phenomenon was up to now not clear. In the article it is shown that the inertia and kinetic energy of material bodies are the consequence of the dependence of the scalar potential of charge on the speed. The relationships, which reflect this law, are obtained.

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