ABOUT THE NATURE OF ELECTRICITY AND MAGNETISM

Electric charges are constantly emitted in all directions by particles, scattering at a constant speed along straight lines. The impact on the charge depends only on the location and speed of these particles near it ... We can say that this will be a kind of mechanical theory of electricity.

W. Ritz

What are electrical and magnetic influences? Modern physics, unfortunately, cannot answer this question, justifying its helplessness with a Newtonian excuse: “It is enough that these forces exist and act in accordance with the stated laws.” However, since the time of Newton, there have been some progress. So, in quantum electrodynamics (QED), it is assumed that attraction and repulsion transfer from one charge to another special particles - virtual photons emitted by charges.

But the authors of QED did not say a word about Walter Ritz, who already in 1908 built a theory of the interaction of charges through the particles emitted by them. And it is not surprising, because then scientists would have to admit that their concepts are based on Ritz's Ballistic Theory (BTR), which contradicts the theory of relativity. Therefore, QED stole from Ritz's theory only its working idea (see epigraph), disregarding the main conclusions of the BTR. Here we will also remove the veil over the Ritz theory, which was only slightly opened in [1].

Let us recall how the interaction of two electrons proceeds according to Ritz. The first electron emits, “shoots” in all directions at the speed of light c special microparticles, conventionally called rheons in [1]. After a while, some of them reach the second electron and are absorbed by it, and each rheon transfers to the electron an elementary portion (quantum) of the impact - the standard momentum p. The total repulsive force of electrons is $F = np$, where n is the frequency at which rheons hit the electron, and p is the momentum transmitted by each rheon. The frequency of hitting the area S perpendicular to the flow of particles is found as $n=kvS$, where k is the concentration of particles in the flow, and v is its velocity. For an electron in a rheon stream, the particle velocity is $v = c$, and S is the area of the electron's equatorial cross section, whence $F = kcSp$. With distance from the electron, the concentration k of the rheons shot by it decreases in proportion to the square of the distance (Fig. 1). Hence, Coulomb's law immediately follows: the force F of repulsion of electrons is inversely proportional to the square of the distance between them.

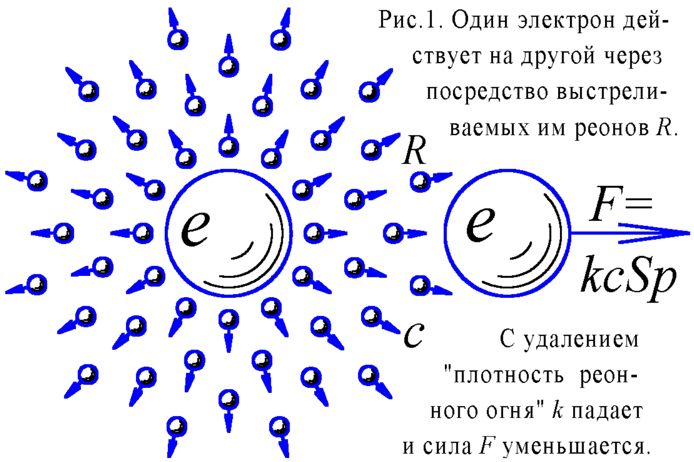

Fig. 1. One electron acts on another by firing rheons R. With removal "rheon density fire" k falls and the force F decreases.

This is how the electrical impact is transmitted, but how do the rheons that get into the electron create it? What is the meaning and magnitude of the elementary momentum p? Ritz's early death did not allow him to answer these questions, but the answers naturally follow from his ballistic model. For example, if automatic bullets hitting a tin can make it fly off in the direction of impact, transferring their momentum mv to it, then cannot rheons, hitting the electron, create repulsion, giving the electron their momentum? The tremendous speed c rheons, even with their insignificant mass m_R, makes this impulse $p = m_Rc$ tangible. The exchange of "shots" will create a repulsion of charges with a force $F = kc^2Sm_R$ acting along the "line of fire".

Of course, this model is grossly mechanical. In the future, it can be clarified and even changed. But as a first approximation that gives a visual mechanical interpretation, it is very convenient. Judging by some of Ritz's remarks from his "Critical Research on General Electrodynamics" (their complete translation into Russian was recently published on the Internet [2]), he himself came to this mechanical model, but postponed its consideration due to serious contradictions. Indeed, the rheon firefight easily explains the interaction of two like charges - the repulsion of two electrons or protons. But how can we use it to explain the attraction of charges of different signs?

Consider the interaction of an electron e^-, which has a negative charge, and its antiparticle, a positron e^+ with a positive charge. Rheons emitted by an electron hitting a positron do not repulse, but attract it: a positron is fundamentally different from an electron in the nature of its interaction with rheons. Likewise, the particles emitted by a positron are radically different from rheons, since they no longer repel, but attract an electron (Fig. 2).

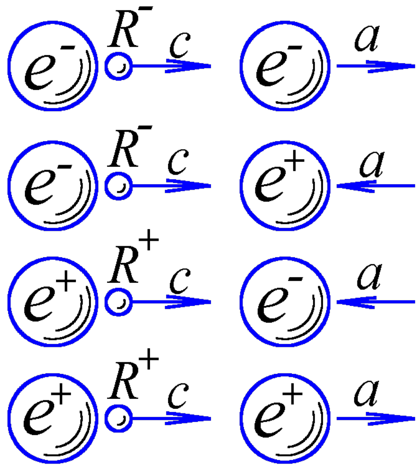

Рис. 2. Характер взаимодействия одно- и разноимённых зарядов посредством реонов *R* определяется ускорением *a*.
Противоположным знакам зарядов "+" и "-" соответствуют противоположные знаки масс частиц.

Figure: 2. Character interactions same and different named charges through rheons R determine which is accelerated at a. Opposite signs are charged and "+" and "-" correspond to opposite particle mass signs.

This incongruity is easily eliminated by one, at first glance, paradoxical conclusion: the electron and positron have different signs not charges, but masses. So, if an electron has a positive mass ($+m_e$), then an antielectron-positron has a negative mass ($-m_e$). In this case, the force F created by the impacts of rheons on the positron gives it, according to Newton's second law, an acceleration $a = F/-m_e$, directed against the force of the impacts: the positron will be attracted to the electron. The positron itself, having a minus mass, emits rheons with anti-mass ($-m_R$) - antirheons, which, when colliding with an electron, create a force $F = -kc^2S\,m_R$, directed against the impacts and, therefore, pushing the electron towards the positron. So, the effect of the charge on the charge is determined by the magnitude of the acceleration $a = kc^2S\ m_R/m_e$ (Fig. 2). When the charges are of the same name, then m_R and m_e are of the same sign and the acceleration a is positive (repulsion), but when they are opposite, then the value of m_R/m_e, as well as a, is negative (attraction).

The conclusion is wild, but far less paradoxical than many of the conclusions of the theory of relativity. It should also be added that Dirac, who actually predicted the existence of an antielectron-positron, believed that it should by no means have an anticharge, but precisely antimass. Nature itself requires the existence of negative mass. So, during the annihilation of an electron with a positron, both particles are destroyed. But where does their mass disappear? According to the theory of relativity, it turns into energy. Classical mechanics does not recognize such a transition, and therefore it must be admitted that the masses of the electron and positron are equal and opposite in sign, and therefore mutually annihilate, giving a total of zero.

Further, it is known that a neutron decays into an electron and a proton, and that, in turn, can be made to decay into ... a positron and a neutron! But a neutron is heavier than a proton, and by an amount of the same order of magnitude as the mass of a positron. Only one conclusion can follow from this: the positron has a negative mass. The structure of these particles also becomes clear: a neutron consists of a heavy neutral particle and an equal number of electrons and positrons, while a proton has one more positron than electrons, hence its positive charge (Fig. 3). This cancels some laws of the transformation of elementary particles, but it removes the question, which has not yet been resolved by modern physics, about why there are many more particles in nature than antiparticles. At least the number of electrons and positrons in atoms will be equal: the electrons of the atomic shell are compensated by the positrons of the nucleus. One must think that the charge of other elementary particles is associated only with the presence of electrons and positrons in them: only they are capable of emitting and absorbing rheons and anti-rheons. All other particles are transparent to the rheons passing through them, like a bullet "blowing through".

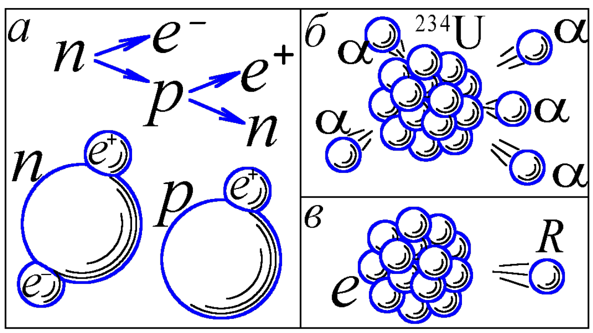

Рис. 3. *а*) распад и строение нейтрона *n* и протона *p*; *б*) ядро урана-234, становящееся после пяти последовательных α-распадов ядром свинца-214; *в*) излучение реонов электроном, вероятно, - тоже следствие распада.

Fig. 3. a) decay and structure of neutron and and proton p; b) the nucleus of uranium-234, which becomes the nucleus of lead-214 after five successive α-decays; c) radiation rheons with an electron is probably also a consequence of decay.

But what causes the emission of rheons and anti-rheons by charges? It is possible that the electron and positron simply decay, like heavy nuclei [1], gradually losing their mass along with the emitted particles. It seems that Ritz himself, speaking about the emission, radiation of particles by charges (he called the BTR emission theory), compared the rheon fluxes coming from electrons with the α- and β-rays of heavy nuclei. The leakage of rheons from an electron should lead to a gradual, albeit extremely slow, decrease in its mass. Such a decrease in the mass of an electron, predicted by the same Dirac, is sometimes indeed confirmed by experiments.

So, we have explained how the force of electrostatic interaction arises. But what is the magnetic force? It is known that a magnetic field is created by the movement of electric charges. Physicists say that, depending on the movement of charges, part of their electric field turns into a magnetic field and vice versa (therefore, they speak of an electromagnetic field, considering electricity and magnetism to be only different manifestations of it). But how this transition occurs, why it is caused by the movement of charges, and what magnetism is in general, modern physics cannot explain. Ritz's theory gives a simple answer to this.

Consider two stationary charges interacting with a force $F = kc^2Sm_R$. Will this force change when the charges approach with a velocity v? Apparently, yes. After all, the speed c of the counter flow of rheons will increase: instead of c, you should write $c' = c + v$, whence $F = k(c+v)^2Sm_R$. The force will increase in comparison with that which would be experienced by resting charges at the same distance. On the contrary, the divergence of charges will reduce this force. The reason for these changes is explained by the ballistic model (Fig. 4). If a standing armored car, shooting a target, goes to it, then the frequency and speed of bullet strikes will increase, and hence the force of strikes on the target.

Рис.4. Подобно огневой силе движущегося броневика, увеличена сила F взаимодействия сближающихся со скоростью v зарядов за счёт возросших скорости $c' = c+v$ и частоты ударов реонов R.

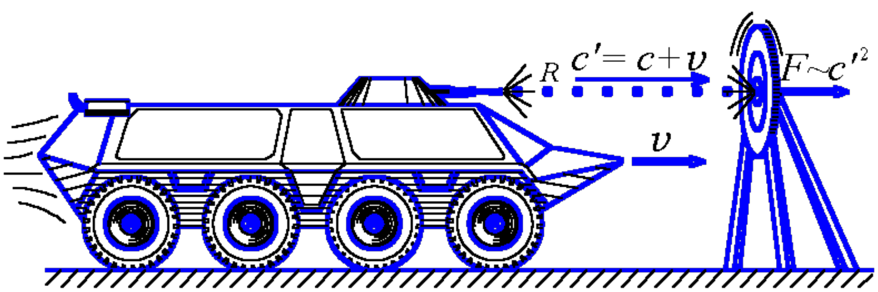

Fig. 4. Like a fire strength of a moving armored car, increased strength F interactions close huddling at speed v charges due to increased their speeds c'=c+v and rheon beat frequency R.

And now consider a charged thread and near it, at point O, charge q. The repulsion force of the charge from the filament $F = q\tau/2\pi\varepsilon_0 r$, where τ is the linear charge density of the filament, r is the distance from it to the charge, and ε_0 is the electrical constant. The force of interaction of a charge with a small section of a filament M of length dl, having a charge τdl, is given by the Coulomb law $F = q\tau dl/4\pi\varepsilon_0 OM^2$. The component of this force perpendicular to the thread will be expressed through the angles φ and $d\varphi$ how as $F_y = q\tau\cos(\varphi)d\varphi/4\pi\varepsilon_0 r$ (Fig. 5). Let us find how the force will change when the charge moves parallel to the thread with speed v. With respect to the moving charge, the counterpropagating rheons will have a velocity c' different from c: the velocity v of the charge will be vector subtracted from c, and the velocity c' of the rheons will be directed not along MO, but along $M'O$ (recall the stellar aberration - the deviation of light rays from stars caused by the motion of the Earth [1]).

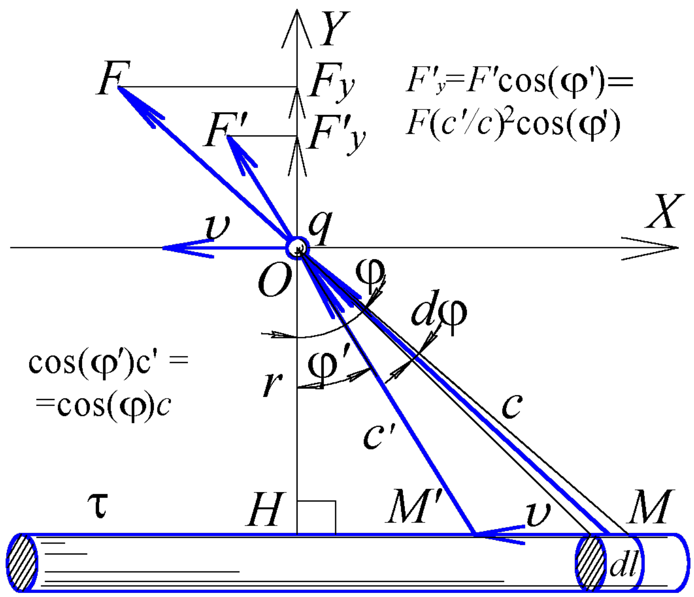

Рис. 5. Проекция $F'y$ силы отталкивания заряда элементом длины dl бесконечной заряженной нити меняется при движении заряда пропорционально скорости c' реонов относительно него.

Fig. 5. Projection F'y of the repulsive force of the charge element of length dl endless charged thread changes when the charge moves in proportion to the speed with c' rheons relative to it.

From the speed triangle OMM′: $c' = \sqrt{c^2 + v^2 - 2cv\sin\varphi}$ or, assuming υ/c small, $c' \approx \rho(1-\sin(\varphi)\upsilon/c + (\upsilon/c)^2\cos^2(\varphi)/2)$. The strength changes accordingly: $F' = F\,(c'/c)^2$. But since the force also changes direction (F' acts along c'), then the component F_y of interest to us will change to a somewhat lesser extent: $F_y' = F_y\,(c'/c) = (1-\sin(\varphi)\upsilon/c + (\upsilon/c)^2\cos^2(\varphi)/2)\cos(\varphi)d\varphi\cdot q\tau/4\pi\varepsilon_0 r$. It remains to find the total force of action on the charge from all elements of the thread, integrating F_y' within φ from $-\pi/2$ to $+\pi/2$. As a result, the total force $F_y' = (1 + \upsilon^2/3c^2)q\tau/2\pi\varepsilon_0 r = q\tau/2\pi\varepsilon_0 r + \upsilon^2 q\tau/6\pi\varepsilon_0 rc^2$. The first term is the force of interaction of the thread with a resting charge, and the second is the addition to it, which has arisen due to motion. So, the movement of a charge with a speed v along the filament causes an increase in the repulsive force (or attraction) by the amount $\upsilon^2 q\tau/6\pi\varepsilon_0 rc^2$.

This result has very important consequences. Consider two parallel conductors with parallel currents. Since the current in the metal is created by the movement of electrons, we replace each conductor with a moving negatively charged thread (Fig. 6). The first thread has a linear charge density - τ_1 and speed υ_1, and the second - $-\tau_2$ and υ_2, respectively. In general, the conductors are neutral, so we add fixed positively charged threads $+\tau_1$ and $+\tau_2$ (they correspond to positive and fixed metal ions). Let us find with what electric force $F_{ел}$ the first conductor (threads $+\tau_1$ and $-\tau_1$) acts on an element of length l of the second conductor (threads $+\tau_2$ and $-\tau_2$). $F_{ел}$ consists of four forces:

a) F_1 acting from the side of the fixed thread $+\tau_1$ on the fixed charge $+\tau_2 l$;

b) F_2, acting from the stationary thread $+\tau_1$ on the moving charge $-\tau_2 l$;

c) F_3, acting from the side of the moving thread $-\tau_1$ on the stationary charge $+\tau_2 l$;

d) F_4, acting from the side of the moving thread $-\tau_1$ on the moving charge $-\tau_2 l$.

The charge velocity $q = \tau_2 l$ relative to the corresponding filament is for the case

a) zero, and therefore the repulsive force $F_1 = \tau_1\tau_2 l/2\pi\varepsilon_0 r$ (according to the formula F_y');

b) v_2, and the force of attraction is $F_2 = \tau_1\tau_2 l/2\pi\varepsilon_0 r + \upsilon_2^2\tau_1\tau_2 l\ /6\pi\varepsilon_0 rc^2$;

c) v_1, and the force of attraction is $F_3 = \tau_1\tau_2 l/2\pi\varepsilon_0 r + \upsilon_1^2\tau_1\tau_2 l\ /6\pi\varepsilon_0 rc^2$;

d) $(\upsilon_1 - \upsilon_2)$, and the repulsive force $F_4 = \tau_1\tau_2 l/2\pi\varepsilon_0 r + (\upsilon_1 - \upsilon_2)^2\tau_1\tau_2 l\ /6\pi\varepsilon_0 rc^2$.

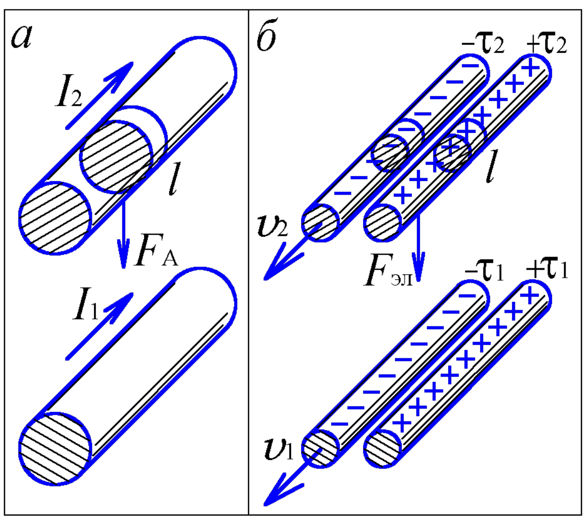

Рис. 6. Представление проводников с током (*а*) комбинациями из двух заряженных нитей (*б*) позволяет выразить амперову силу их притяжения как сумму сил электрического взаимодействия нитей.

Figure: 6. Representation of conductors with current (a) combinations of two charged strands (b) allows expressing the ampere force of their attraction as the sum of the forces of electrical interaction of the threads.

The resulting force of attraction $F_{ел} = F_2 + F_3 - F_1 - F_4 = \upsilon_1\upsilon_2\tau_1\tau_2 l / 3\pi\varepsilon_0 rc^2$. Thus, the movement of charges in conductors upsets the balance of interaction forces, the forces cease to compensate each other. As a result, conductors with current are attracted, or repelled, if the currents are directed in different directions ($\upsilon_1\upsilon_2$ is negative). The quantity $\upsilon_1\tau_1$ is nothing more than the current I_1 in the first conductor, and $\upsilon_2\tau_2$ is the current I_2 in the second. Taking this into account and applying the well-known formula $1/c^2 = \varepsilon_0\mu_0$, we obtain $F_{ел} = \mu_0 I_1 I_2 l/3\pi r$. But the interaction of parallel currents is similarly described by Ampere's law: $F_A = \mu_0 I_1 I_2 l/2\pi r$, which, however, gives a force one and a half times greater. This slight discrepancy, in principle, can be eliminated by refining the formulas for the rheon effect or the formulas of Coulomb and Ampere (a change in their coefficients by one and a half to two times is quite acceptable by the accuracy of experiments on measuring the ratio of electric and magnetic charge units [3]).

So, there is no need for a magnetic field, because what is considered to be a magnetic force is possibly just an uncompensated increase in the electric force arising from the movement of charges. In turn, this increase is a natural consequence of the ballistic model of the interaction of charges and the addition of the speed of propagation of light or an electric field with the speed of the source. In other words, according to Ritz, magnetic forces and fields do not exist, and for their manifestations we mistakenly take the result of changes in electrical forces. That is why no magnetic "charges" have been found - monopoles predicted by Dirac, the existence of which should result from the equality, reversibility of fields. And light, contrary to Maxwell, may well spread without the help of a magnetic field. On the contrary, it is precisely the finite speed of light, rheons that generates magnetic effects.

The influence of the motion of the charge on the magnitude of the electric force, as Ritz showed, makes it possible to explain relativistic effects, for example, the result of Kaufman's experiments [4], where the strange fact of an increase in the mass of electrons with an increase in their speed was first discovered. Ritz suggested that there was no need to consider mass as a variable to explain the experiment. In Kaufman's experiments, the mass of an electron was judged by how much it was deflected by an electric and magnetic field. These deviations were measured by the trace left by the electron beam on the fluorescent screen. The deviations give the magnitude of the acceleration a, associated according to Newton's second law $a = F/m$ with the mass of the electron. So, when it was found that with an increase in the speed of an electron, its acceleration turns out to be less than the calculated one, they considered that this was caused by an increase in its mass. But it is much more natural to assume that the mass is constant, but the force changes. This conclusion is all the more natural because, as has been shown, the charge rate can indeed affect the magnitude of the electric and magnetic force.

Theoretically, the trace of the electron beam on the screen should have had the shape of a parabola with the equation $y = kx^2Em/H^2$, where k is some constant, E and H are the strengths of the electric and magnetic fields, and m is the electron mass. The observed curve differed from this parabola as if with increasing velocity the mass m increased proportionally $(1 + \upsilon^2/2c^2)$. But after all, as it was found out, in almost the same way, proportionally to $(1 + \upsilon^2/3c^2)$ the electric force and the field E increase with the speed of the charge. Taking into account the variability of E at a constant mass will introduce into the parabola equation almost the same changes as taking into account the variability of m at a constant E. The difference in the coefficients by one and a half times is eliminated by a more accurate calculation, see [2].

So, the ballistic model and Ritz's theory not only agree with all electrical and magnetic effects, including relativistic ones, but also allow one to clearly describe their nature within the framework of the classical picture of the world. But the most surprising thing is that the idea of the influence of the movement of a charge on the magnitude of the electric force arose a long time ago. Long before Ritz (as he himself notes) it was expressed by Weber, back in the middle of the 19th century, who built on its basis electrodynamics, considering magnetic and inductive forces as a consequence of changes (during the movement and acceleration of charges) of electrical forces [3, 5].

But this wonderful concept was rejected, and ironically, the very fact from which it should have flowed. The fact is that Weber was a supporter of the theory of action at a distance, that is, the instantaneous spread of influences. And he did not deduce his formulas describing the influence of motion on the magnitude of the electric force, but simply selected [5]. And yet, as has been shown, they can be derived strictly, adhering to the directly opposite principle - considering that the impact is transmitted not instantly, but with a delay, through some intermediate agent (rheons). It is easy to verify that the assumption of an instantaneous transfer of impact with an infinite speed of rheons ($c = \infty$) would lead, on the contrary, to a constant value of force that does not depend on the movement of charges.

It should be noted that the theories of Weber and Ritz lead to the law of interaction of currents different from the generally accepted one. So, it is believed that magnetic forces are always perpendicular to currents (Fig. 7). But this violates the principle of action and reaction, especially if one current flows along, and the other across the line *MN* connecting them - here one of the forces is generally zero. In Weber's theory, the forces of magnetic interaction are always equal and oppositely directed. And Ampere himself, who discovered the interaction of currents, argued that magnetic forces act along the line connecting the elements, and the law of interaction of currents experimentally found by him and confirmed by Weber [3], as well as the law following from Ritz's theory, does not coincide with the generally accepted one, as follows from the Bio-Savart-Laplace law.

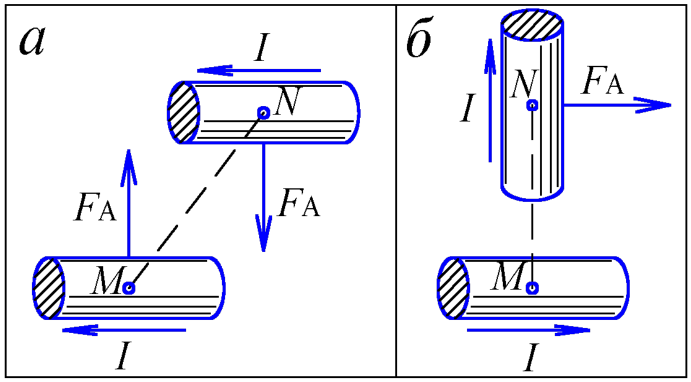

Рис. 7. Нарушение 3-го закона Ньютона общепринятым законом взаимодействия параллельных (*а*) и перпендикулярных (*б*) токов: силы направлены под углом к *MN*, а в случае *б* в точке *M* силы вообще нет.

Figure: 7. Violation of Newton's third law by the generally accepted law of interaction of parallel (a) and perpendicular (b) currents: the forces are directed under angle to MN, and in case b at point M there is no force at all.

Experimentally, it has not been possible to reveal the erroneousness of the generally accepted law so far, because no one set such a task, although the discrepancy with the Ampere-Weber law should have prompted this long ago. Of course, the experiments of Ampere and Weber are time consuming, but the equipment they need is the simplest. An accurate establishment in an experiment of the actual law of interaction of currents would be the simplest and most effective proof of Ritz's Ballistic Theory. Perhaps it is precisely the erroneous ideas about the nature of electricity and magnetism, about the laws governing them that slow down the progress of science, preventing the creation of high-temperature superconductors and other seemingly fantastic devices, such as an antigravitor and a force field generator.

Sergey Semikov

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