# PARADOXES OF ELECTRODYNAMICS AND THEIR SOLUTION IN BALLISTIC ELECTRODYNAMICS

***S.A. Semikov***

**Nizhny Novgorod State University**

**(Abstracts of the XX Scientific Conference on Radiophysics, May 13, 2016)**

Modern electrodynamics, based on Maxwell's equations, contains a number of contradictions, paradoxes, both internal (theoretical) and external contradictions with experiments [1, 2]. In recent years, more and more experimental paradoxes have been discovered, which creates the need for a more accurate theory of electromagnetism. In a number of cases, pre-Maxwellian theories of electricity (Gauss, Weber) based on the principle of relativity, incl. Ritz's ballistic theory (BTR) [3–5].

Unlike Maxwell's field phenomenological electrodynamics, ballistic theory gives a microscopic description, according to which the elementary forces of interaction of charges are determined not by the state of space (field), but by the relative coordinates, velocities and accelerations of charges. In Ritz's theory, charges interact through the elementary particles emitted by them - rheons [5], constantly flying out in all directions at the speed of light $c$ relative to the charge. The velocity $\mathbf{v}$ of the charges is added to the velocity of the particles emitted by them, as $\mathbf{c}' = \mathbf{c} + \mathbf{v}$, and the elementary forces $\mathbf{F}'$ between the charges differ from the static one $\mathbf{F} = \mathbf{c}F/c$,– $F' = fp = F(c'/c)^2$, $\mathbf{F}' = \mathbf{c}'Fc'/c^2$, where $f = nSc'$ is the frequency of impacts into the absorption cross section of $S$ rheons at their concentration $n$, $p = mc'$ is the rheon momentum of mass $m$.

The relative nature of the forces elementarily explains the paradox of the interaction of parallel flying beams of electrons with a charge density $\tau$, velocity $V$, spaced at a distance $h$. In the laboratory frame of reference, the force $F_\Sigma = F_\text{э} - F_\text{м} = \tau^2 l/2\pi\varepsilon_0 h - \mu_0 I^2 l/2\pi h$ acts on the segment $l$ of each beam. And in a system moving with beams, $F_\text{э} = \tau^2 l/2\pi\varepsilon_0 h > F_\Sigma$. Ballistic theory naturally solves this paradox: in both systems the force $F = \tau^2 l/2\pi\varepsilon_0 h$, since relative velocity $v = 0$, $c' = c$ and $F' = F(c'/c)^2 = F$. And with the mutual motion of charges, the dependence $F' = F(c'/c)^2$ creates magnetic forces in the form of small additions $\Delta F_\text{э}$ to the Coulomb force $F_\text{э}$. $\Delta F_\text{э}$ coincides with the expression for the Ampere force $F_\text{м} = \mu_0 I^2 l/2\pi h$ up to a factor of 1.5 [5], which was confirmed in separate experiments. This difference will clearly manifest itself in the pinch effect.

In the special theory of relativity (SRT), the experiment is explained by the Lorentz contraction, increasing $\tau'$ and $F_\text{э}' = \tau'^2 l/2\pi\varepsilon_0 h$, compensating for the decay of the force $F_э' - F_м = F_э$ [6]. In Ritz's theory, these relativistic effects are explained classically. So, Kaufman's experiment can be interpreted not as an increase in mass, but as a change in the force $\mathbf{F}'$ on the BTR [3]. Ritz's theory also solves the paradox of unequal growth of the longitudinal and transverse mass of an electron [3, 5, 7]: in BTR, the mass is constant, the force changes, depending on both the magnitude and the direction of the velocity $\mathbf{v}$ relative to the force $\mathbf{F}' = \mathbf{c}'Fc'/c^2$.

Discrepancies with Maxwellian electrodynamics were also found in the Aharonov-Bohm effect when electrons are deflected near a long solenoid with current (in the region where the field $B = 0$), which is recorded by the change in the interference pattern of electrons when the current is switched on through the coil. According to Ritz's theory, there is a magnetic effect outside the coil as well. the expression for the force $\mathbf{F}'$ contains terms of higher orders in $\mathbf{v}$. A similar effect was discovered in Solunin's experiment [2] on the deflection of electrons in a kinescope by a toroidal coil, outside of which the field $B = 0$.

Finally, experiments are known to register the longitudinal to the current component of the magnetic force, contrary to Ampere's formula. In BTR, these forces are naturally obtained from $\mathbf{F}' = \mathbf{c}'Fc'/c^2$, but they are orders of magnitude less than the transverse Ampere force (from the compensation of forces in different sections of the conductor), or the forces are directed so that they are not registered by the frame. But in the experiments of Grano, Okolotin, Sigalov, where the conductor floats in mercury or sliding contacts are used, the longitudinal component of the Ampere force was found [2]. In Maxwell's electrodynamics, these effects are either not explained or interpreted by new hypotheses about the ion current in mercury, etc.

In experiments on accelerators, it was found that during acceleration of particles in the potential difference $U$, their kinetic energy $W$, found by SRT from the velocity $V$, exceeds $eU$, contrary to the energy conservation law [8]. In Ritz's theory, $W = mV^2/2 < eU$. Energy is lost from phase matching (in cyclic accelerators) and force decay $F' = F(c'/c)^2$, where $c' = c - V$ (in direct-action accelerators).

The $F'(V)$ dependence was also found in experiments on the scattering of relativistic protons in colliders [9]. With an increase in the particle energy, the scattering cross section increased anomalously, contrary to Maxwell's electrodynamics (where the scattering angle θ according to Rutherford's formula $\cot(\theta/2) = mV^2b/2Ze^2$), but in accordance with the Ritz theory, where the force $F' = F(c'/c)^2$ grows with approach, and $\cot(\theta/2) = mV^2b/2(1 + aV^2/c^2)Ze^2$. Anomalies were also discovered in experiments on the annihilation of an electron and a positron: apart from the rest energy of particles $W = 2mc^2$, potential energy $eU$ would be released, which, when approaching $r_0 \sim 3\cdot10^{-15}$ m, will be of the order of $W_e \sim 2mc^2$.

Its absence in experiments means that the annihilation energy is the energy $eU$ released when particles approach each other [10].

Finally, ballistic electrodynamics explains in an elementary way the random motion of an electron in regular electromagnetic fields as a result of quantizing the interaction transmitted by the impacts of individual rheons. As a result, the electron moves like a Brownian particle [11]. Thus, ballistic electrodynamics solves all known theoretical and experimental paradoxes.

[1] Feynman R. et al. Feynman Lectures on Physics. T. 6.M .: Mir, 1977.346 p. [Фейнман Р. и др. Фейнмановские лекции по физике. Т. 6. М.: Мир, 1977. 346 с.]

[2] Nikolaev G.V. Consistent electrodynamics. Tomsk: NTL, 1997.144 p. [Николаев Г.В. Непротиворечивая электродинамика. Томск: НТЛ, 1997. 144 с.

[3] Ritz W. // Ann. Chim. Phys. 1908. V. 13. P. 145. [Ritz W. // Ann. Chim. Phys. 1908. V. 13. P. 145.]

[4] Elyashevich M.A. and others. Preprint No. 710 of the Academy of Sciences of Belarus: Minsk, 1997. 22 p. [Ельяшевич М.А. и др. Препринт №710 АН Беларуси: Минск, 1997. 22 с.]

[5] Semikov S.A. BTR and a picture of the universe. N. Novgorod: Perspective, 2013.612 p. [Семиков С.А. БТР и картина мироздания. Н. Новгород: Перспектива, 2013. 612 с.]

[6] Suorts K. Unusual Physics of Ordinary Phenomena. Moscow: Nauka, 1987.384 p. [Суорц К. Необыкновенная физика обыкновенных явлений. М.: Наука, 1987. 384 с.]

[7] Okun LB // Phys. 1989. T. 158. No. 3. P. 511. [Окунь Л.Б. // УФН. 1989. Т. 158. №3. С. 511.]

[8] Liangzao Fan // Tr. Congr. "Fundamental Problems of Natural Science", 2010. [Лиангзао Фан // Тр. конгр. "Фундаментальные проблемы естествознания", 2010.]

[9] Khachatryan V., Sirunyan A., Tumasyan A. // Phys. Rev. D. 2015. V. 92. P. 012003.

[10] Manturov V. // Technology for youth. 2006. No. 2. P. 2. [Мантуров В. // Техника–молодёжи. 2006. №2. С. 2.]

[11] Vinokurov N.A., Levichev E.B. // Phys. 2015. T. 185. No. 9. P. 917.

Installation date: 06/22/2016

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