On Electrodynamic Forces.

J.G. Klyushin, Academy of Civil Aviation, St. Petersburg, Russia, e-mail: science@shaping.org

Historically electrodynamics began when Gauss and Weber generalized Coulomb law for the case of moving charges. In the framework of this approach interaction force between two charges depends on their velocities difference, i.e. on their relative movement. Some authors (for instance [1]) show that this approach has not exhausted yet. Spenser and her collegues [2] have generalized this approach and shown that some experiments which can't be explained in the framework of today electrodynamics may be naturally explained in terms of relative movement. These and other papers began a rebirth period for Gauss-Weber ideas. In particular Bernstein [3] shows that Weber formula has already covered all "relativistic effects".

Historically Gauss-Weber approach was eclipsed by the field Maxwell approach and forgotten by the end of 19^{th} century. For instance Einstein apparently didn't know Weber's papers. At any rate he never mentioned Gauss and Weber although resemblance of the consequences from both theories are surprising.

Maxwell theory investigates the problem not of charges interaction but of the "field" created by a moving charge in the surrounding space. It order to come to interaction force an additional postulate is introduced. It is usually called Lorentz force formula. This formula describes interaction of the fields created by a moving charge with another charge called "test charge". This test charge is supposed not to create fields of it's own but external fields created by the first charge are supposed to directly act on this test charge. Although Lorentz force formula predicts results of many experiments its effect in today form looks completely unsatisfactory. Many authors (for instance [2]) shows that Lorentz force formula isn't able to explain a lot of experimental facts. Lorentz force asymmetry also leads to many theoretic and aesthetic problems. If it is considered exhaustive we come to contradiction to the third Newtonian law: it lets situations when one charge acts on the other and this other doesn't act on the first one.

It addition if we don't accept ether concept then the very idea of "absolute velocity" which appears in Lorentz force formula turns to be suspended. Actually unsatisfaction in this side of the formula stimulated Einstein with his Relativity Theory. In other terms Lorentz force formula in its today form is asymmetric and not universal.

Ampere [4] and Whittaker [5] proposed formulas of their own to describe charge interaction force. They did this in terms of "differential currents". When paraphrased in terms of moving charges these formulas could expand and symmetries Lorentz force formula. But their "field sence", i.e. their connection with Maxwell equations was not clear uptill recently.

This paper author proposed certain generalization as Maxwell equation as Lorentz force formula [6], [7]. Generalized formula implies Lorentz, Ampere, Whittaker, Weber and Spenser formulas. It also includes some additional items not known previously. For instance it predicts cluster effect, Bohm-Aharonov effect and electro-weak interaction.

Weber formula has the same invalidness as Lorentz one: it is asymmetric and not universal. Generalized formula includes items which make Weber formula symmetric and coordinate it to the whole set of experiments.

Generalized formula for charge interaction is naturally modernized to describe photons interaction [8]. And this explains some quantum paradoxes.

References.

[1] Andre K. T. Assis. Relational Mechanics, Apeiron Montreal, 1999.
[2] D. E. Spencer, G. Coutu, W. W. Bowley, U. Y. Shama, P.J. Mann, "The Experimental Verification of the New Gaussian Equation for the Force between Moving Charges: Overhead Welding", International Conference on Space, Time and Motion.,September, 1996, 23-29, St. Petersburg, Russia.
[3] V. M. Bernstein, " Electrodynamics and Gravitation Based on Trends Preceeding Maxwell and Einstein", Galilean Electrodynamics, v11, №5, p 91.
[4] A. M. Ampere, " Theorie mathematique des phenomenes electrodynamiques uniquement deduite de l'experience", Blanchard, Paris, 1958
[5] E. T. Whittaker, " A History of the Theories of Aether & Electricity, p 91 (Longman, Green and Co, London, 1910)
[6] J. G. Klyushin, " A Field Generation for the Lorentz Force Formula", Galilean Electrodynamics, v11, № 5, p 83.
[7] J. G. Klyushin, " Generalised Electrodynamics and Lorentz Force Formula", NPA conference proceeding, Storrs, Connecticut, 2003.
[8] J. G. Klyushin, " Wave Solution and Quantum Mechanics – Part 1", Galilean - Electrodynamics & GED – East, V.15, Special Issue2, Fall 2004.