Electro and Gravidynamics

Jar.G. Klyushin
St. Petersburg, Russia, Academy of Civil Aviation
science@shaping.org

It turned out historically that elementary particles behavior is described the with help of Shroedinger equation and Heisenberg matrix mechanics. This is strange because the object for description is mainly electrically charged particles.

We shall not make a mistake if say that feel of disillusionment and lack of any prospect are observed among specialists in quantum mechanics.

We believe it is high time to return to sources and to reunderstand fundamental concepts. The aim of this lecture is to make some steps in this direction and to try to solve some problems of elementary particles on the basis of Generalized Electrodynamics [1] and Gravidinamics [2]. Equations of Generalized Electrodynamics look as follows.

$$div\overline{E} = \rho_e / \varepsilon_0 \qquad (1)$$

$$div\overline{B} = -\rho_e / c\varepsilon_0 \qquad (2)$$

$$curl\overline{E} = -d\overline{B} / dt \qquad (3)$$

$$c^2 curl\overline{B} = d\overline{E} / dt \qquad (4)$$

Here $\overline{E}$ is electric field, it has dimension of velocity m/s, $\overline{B}$ is nondimensional magnetic field, it has meaning of rotation angle, ρ_e is electric charge density, ε_0 is electric constant, $c = c_0\left[\left(\bar{i} \times \bar{j}\right) \times \bar{k}\right]$, where c_0 is light velocity in free ether, $\bar{i}, \bar{j}, \bar{k}$ are unit vectors of right hand Descartes reference system. Let us ask one question which was not for some reason asked previously even by mathematicians who investigated Maxwell equations. If we search for two vector functions $\overline{E}(t, \bar{r})$ and $\overline{B}(t, \bar{r})$ then it is necessary and sufficient for us to have two vector equations. But in system (1)-(4) we have two scalar equations in addition. Does this mean that Maxwell system is overdetermined? Attentive analyses shows that everything is O.K.

Actually correlations (1), (2) are not equations they are initial conditions for $\overline{E}$ and $\overline{B}$.

Apparently fathers of electrodynamics were so impressed by the fact of discrete character of electric charge that introduced initial conditions in form (1), (2). This is not convenient for us first because it tries to describe vector correlations in scalar form and second because it does not correlate with modern tradition in the theory of equations with private derivatives. Therefore correlations (1), (2) should be rewritten in habitul form as

$$\overline{E}(0, \bar{r}) = \frac{\rho_e}{3\varepsilon_0} \bar{r} \qquad (5)$$

$$\overline{B}(0, \bar{r}) = -\frac{\rho_e}{3\varepsilon_0 c} \bar{r} \qquad (6)$$

Here $\bar{r}$ is radius-vector to the point where the charge is situated and ρ_e is assumed constant. One can verify that (1), (2) result from (5), (6).

Gravidynamic field description is proposed in [2]. Its generalized form looks as follows

$$div\overline{G} = \gamma\rho \qquad (7)$$

$$div\overline{D} = -\gamma\rho / a \qquad (8)$$

$$curl\overline{G} = -d^2\overline{D} / dt^2 \qquad (9)$$

$$a^2 curl\overline{D} = {d^2\overline{G}}/{dt^2} \qquad (10)$$

Here $\overline{G}$ is gravitational field, it has physical dimension of acceleration m/s^2, $\overline{D}$ is nondimensional gravimagnetic field, it has meaning of the angle of rotation, γ is gravitational constant, ρ is mass density, a is constant acceleration with which gravidynamic field moves in free ether. It is analogous to light velocity for electric field. One can say that electric field is a field of velocities and gravity is a field of accelerations. Equations (9), (10) are similar to (3), (4) but the second derivatives with respect to time change the first ones. All the words that were said about equalities (1), (2) may be said about (7), (8). Therefore we change them for initial conditions

$$\overline{G}(0,\overline{r}) = \frac{\gamma\rho}{3}\overline{r} \qquad (11)$$

$$\overline{D}(0,\overline{r}) = -\frac{\gamma\rho}{3a}\overline{r} \qquad (12)$$

If

$$\overline{G} = {d\overline{E}}/{dt} \qquad (13)$$

$$\overline{D} = \overline{B} \qquad (14)$$

then one can come from system (3)-(6) to system (9)-(12). We shall not go this whole way in details here but just write out the results of such analyses.

Electric charge

$$q = {dm}/{dt} \qquad (15)$$

For electron this means that

$$q = m\omega \qquad (16)$$

where $\omega = a/c$ is angular velocity of electron's mass m curling.

Correlation (13) yields that such a constructed electric field $\overline{E}$ has physical dimension of velocity m/s. If so electric constant ε_0 has dimension of mass density $kg/м^3$ and physical sense of free ether mass density. Sadly one cannot deduce numerical value of constant acceleration a from the very equations. Therefore one cannot define numerical value for ω and ε_0 theoretically. It was assumed in [2] that

$$1/{\gamma\varepsilon_0} = 2\pi s^2 \qquad (17)$$

If this assumption is correct one can find ω from experiment al data. Experiment shows that the force of static repulsion between two electrons is $4{,}17\cdot 10^{42}$ greater than their gravitational attraction, i.e.

$$\frac{m^2\omega^2}{\gamma\varepsilon_0 m^2} = 2\pi\omega^2 = 4{,}17\cdot 10^{42} \qquad (18)$$

This yields

$$\omega = 8{,}1\cdot 10^{20}\ \mathrm{rad}/\mathrm{sec} \qquad (19)$$

This numerical value coincides with De-Broglie frequency of electron in rest. Actually this coincidence is justification for assumption (17).

If one assumes that tangential velocity of the rotating mass in electron

$$r_0\omega = c \qquad (20)$$

then

$$r_0 = 3{,}8\cdot 10^{-13}\ м \qquad (21)$$

This coincides with Kompton wave length for electron.

This leads us to a notion of electron as a massive torus. Torus mass creating electron performs two curls: in equatorial and meridional planes. Equatorial rotation defines electric charge and meridional rotation defines electron's spin. Radius of the bigger circumference describing torus is number (21) and the lesser circumference radius

$$\rho_0 = r_0/2 = 1{,}9 \cdot 10^{-13}\ м \qquad (22)$$

Angular velocity of the meridional rotation is

$$\Omega = 2\omega = 16{,}2 \cdot 10^{20}\ \text{rad}/\text{sec}$$

and

$$r_0\omega = \rho\Omega = c \qquad (23)$$

Electron's spin is impulse moment of its meridional rotation

$$m\left(\rho_0 \times \left(\overline{\Omega} \times \rho_0\right)\right) = m\rho_0^2\overline{\Omega} = \overline{\hbar}/2 \qquad (24)$$

Hence electron's mass

$$m = 9 \cdot 10^{-31}\ \text{kg}$$

It coincides with its experimental value. Electron's charge

$$e = \frac{m\left(\overline{\omega} \times \overline{\Omega}\right)}{\left|\overline{\Omega}\right|} \qquad (25)$$

This is modulo constant vector directed along or against the bigger circumference radius. Its sign (to or from the bigger circumference center) is defined by the screw, which $\overline{\omega}$ constitutes with $\overline{\Omega}$ or (this is the same) with spin direction. The spin itself is directed along the angular velocity of the lesser circumference creating torus. It is modulo constant vector. Its sign is defined by the screw it constitutes with velocity vector when electron is moving, i.e. electron's spin sign is not defined for electron in rest. One can say that spin is an external characteristic of electron and its sign is its internal characteristic.

When electron and positron are collided either meridional or their equatorial rotations are inevitably do not coincide. This leads to the bigger circumference break and creation (as a rule) of two cylinders-photons. This cylinders' radii become twice greater and their angular velocity becomes twice less. Therefore photon's spin

$$\overline{S} = mr_0^2\overline{\omega} = \overline{\hbar} \qquad (26)$$

When we try to describe not electron itself but the wave it creates in ether we must change real charge conditions (5), (6) to complex wave ones:

$$\overline{E}\left(0, \overline{r}\right) = \frac{\omega\overline{p}}{p^2}\exp\left\{i\left(\overline{p} \cdot \overline{r}\right)\right\} \qquad (27)$$

$$\overline{B}\left(0, \overline{r}\right) = \frac{\omega\overline{p}}{p^2 c}\exp\left\{i\left(\overline{p} \cdot \overline{r}\right)\right\} \qquad (28)$$

Here $\overline{p}$ is normal vector modulo equal to wave vector $\overline{k}$ but perpendicular to electron's velocity. The wave created by moving electron is essentially three-demensial object and represents unity of longitudinal transversal and torsional vibrations.

Characteristic quality of photon is lack of electric charge. This means that equalities (5), (6) should be null

$$\overline{E}\left(0, \overline{r}\right) = 0 \qquad (29)$$

$$\overline{B}\left(0, \overline{r}\right) = 0 \qquad (30)$$

Photon is essentially two-dimensional object and represents unity of longitudinal and transversal or torsional vibrations. Transversal vibration corresponds the case of linear polarization.

Let us note that equations (3), (4) and initial conditions (5), (6) are not sufficient for unique description of an object. For such a description we need border conditions in addition to initial (3), (4). Nowadays we have no clear physical reasoning for writing out this border conditions because they should describe “creation” of electric and magnetic fields in the process. As a first step in this direction one can propose such formulas

$$\overline{E}\left(t,\overline{r_0}\right)=\overline{r_0}\times\overline{\omega} \tag{31}$$

$$\overline{B}\left(t,\overline{r_0}\right)=-\frac{\overline{r_0}\times\overline{\omega}}{c} \tag{32}$$

They mean that electron and photon are ether curls. But it is not clear nowadays why there exists certain correlation between curl radius r_0, its angular velocity ω and the mass m, drawn into the curl from the ether such that $mr_0^2\overline{\omega}=\overline{\hbar}$ for photon (cylinder) and $m\rho_0^2\overline{\Omega}=\overline{\hbar}/2$ for torus.

These questions should be answed in future.

There are even more questions concerning gravidynamic equations (9), (10). Initial conditions (11), (12) are accurately analogues of conditions (5), (6) and describe the case when gravidynamic charge (mass) exists. Right hand parts of (5), (6) for photon are null. We can suppose that right hand parts of conditions (12), (13) are also null when graviton is described. In addition we must define initial conditions for G and D first derivative.

Should they obligatory coincide with initial conditions for electric field? Or in other terms: is electric field by the only field originated gravity? We cannot answer this question for sure nowadays.

Apparently initial conditions for gravifield velocity should look as follows

$$\overline{G}'\left(0,\overline{r}\right)=\frac{\gamma\rho}{3}\left(\overline{r}\times\overline{\omega}\right) \tag{33}$$

$$\overline{D}'\left(0,\overline{r}\right)=-\frac{\gamma\rho}{3a}\left(\overline{r}\times\overline{\omega}\right) \tag{34}$$

One can suppose that border conditions for gravifield should look as follows

$$G\left(t,\overline{r_0}\right)=\overline{r_0}\times\varepsilon \tag{35}$$

$$D\left(t,\overline{r_0}\right)=-\frac{\overline{r_0}\times\varepsilon}{a} \tag{36}$$

where ε is angular acceleration.

This would mean that angular velocity in electron and photon

$$\omega=\int_0^\tau \varepsilon\,d\tau \tag{37}$$

where τ is time of mass acceleration in the process of electron and photon creation. Gravifield seizes ether mass on the border r_0 and accelerates it to light velocity. Initial conditions (11), (12) and (33), (34) define either electron or photon is created.

Hypotheses (31)-(37) are proposed for discussion.

References

[1]. J.G. Klushin, “A Field Generalization for the Lorentz Force Formula”, Galilean Electrodynamics 11, 83-90 (2000)

[2]. J.G. Klushin, On the Maxwell Approach to Gravity (St. Petersburg, Russia, 1995)