The theory of electromagnetic field motion
8. Core of electron

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The model of the core of electron as central region of electromagnetic vortex is proposed. The model is based on the structure of atmospheric vortex or tornado. Such electromagnetic vortex was shown to be stable due to balance between radial and axial forces which act in the core of electron. Hydrogen atom model was proposed which is based on representation of electron as a vortex of electromagnetic energy and is free of contradictions with classical electrodynamics which is characteristic for Rutherford – Bohr model. Proposed model does not contradict to quantum representations of electron at atomic orbit as electronic cloud.

8.1. Introduction

In paper [1] relations have been obtained for electric and a magnetic field of electron, and also for electric charge distributions. Obtained relations concern outer area of electron, they cannot be applied to internal area, or the core of electron, because they result in infinitely large mass as in the case of classical electron. Our problem in present paper, as we consider, is to completely describe, whenever possible, the core of electron, and also interaction of electron with positive charge of hydrogen atom nucleus. However we shall preliminarily discuss properties of electron, yet not considered in [1].

As was mentioned in [1], the electron mathematically represents itself a vortex of an electromagnetic field and is point formation. Thus, the electron, like a classical point electron, should have infinitely big mass that conflicts with physical representations and facts observed. We cannot simply put, as in quantum mechanics, that its mass is finite value. In the quantum mechanics this statement is one of postulates, the axioms which it is based upon. We should answer a question, *why* its mass is finite value.

All vortexes known in nature are not point formations, they have the special central region in which the laws are different from that in the outer part of the vortex. This central region, unlike the outer area, is not practically investigated theoretically, it is noticed only that the vortex is steady formation thanks to balance of forces: the centrifugal force and the pressure force directed to the centre, where pressure is below than

atmospheric value. But this statement is also based not on some developed theory, but on the facts obtained experimentally.

Certainly, the nature of an atmospheric vortex and electromagnetic vortex is different, and the nature of forces inside these vortexes is also different. However, the facts are widely known when various processes in the physical relation are described by the same mathematical expressions. Such processes are possibly said to be similar. Vortexes of the various physical nature have similarity indications. Let use this similarity to build theory of structure of electromagnetic vortex central region, or its core.

Certainly, this theory has hypothetical character. Such a theory, as well as any new theory, should not conflict with any of the known experimental facts and should explain at least a part of the facts physical interpretation of which results in difficulties. Our first problem in the present work is to reveal the forces which act in core of electron and balance of which is responsible for stability of an electromagnetic vortex behind which, certainly, hides an electron. Our second problem is to reveal all consequences of such a structure of core for electron and for other elementary particles.

8.2. Core of electron

Differences between atmospheric and electromagnetic vortexes are obvious. What unites them? In both cases energy circulates around the central axis. In outer areas of both vortexes the energy flux density falls very sharply with distance (see expression (6.44) for electromagnetic vortex [1]). But it does not concern the central region atmospheric vortex.

As a result of observations it was established that the internal area of a vortex (tornado) consists of internal cavity, where pressure is below atmospheric, and vortex walls, where wind velocity is comparable to sound velocity. Among known literature it is described most detailed in the monograph [2].

Let use this description as a basis for electron core model. Thus the density of kinetic energy flux around atmospheric vortex central axis we consider to be analog of density of electromagnetic energy flux around electron rotation axis.

The density of electromagnetic energy flux $\mathbf{P}$ is defined by expression:

$$\mathbf{P} = k\mathbf{S} = k\varepsilon_0 c^2 \left[\mathbf{EB}\right], \tag{8.1}$$

Where **S** – is Poynting vector, ε_0 - is an electric constant, c –is the velocity of light, **E** and **B** – are electric field strength and magnetic field induction respectively, and k – is dimensionless factor.

Expression (8.1) differs from known expression for Poynting vector **S** only by presence of factor k and when k = 1 these expressions are identical, however, as will be shown in one of the nearest papers, the factor k is not always equal to the unit. In our case this is not the matter of principle, the dependence of electromagnetic energy flux **P** on **E** and **B** is only important.

Let consider only equatorial plane of electron for the purpose of simplification.

Since electric field is secondary in relation to magnetic field (at least it concerns our case) it is possible to get rid of electric field strength **E** in the equation (8.1) by means of expression 6.6 [1]. Taking into account (6.6) let transform the equation (8.1) to scalar form since all vectors are orthogonal and their directions are known:

$$P = k\varepsilon_0 c^2 \omega r B^2, \tag{8.2}$$

where ω – is angular velocity of electron rotation, r – is the distance from electron rotation axis. In (8.2) it was taken into account that magnetic flux line motion linear velocity $\mathbf{V}_\mathrm{m}$ in (6.6) is equal to ωr according to equation (6.5) [1].

Thus, the density of energy flux circulating around an electron axis, at the fixed distance from an axis is proportional to the square of magnetic field induction. This formula is valid in equatorial plane both in the outer area and in electron core. In outer area the dependence of magnetic field induction on distance is known, whereas this dependence in core is necessary to obtain. Let obtain it using as a basis of model the atmospheric vortex (tornado).

In an internal cavity the energy flux in atmospheric vortex is small and has no sharp differences. In electromagnetic vortex it corresponds, as apparent in (8.2), to low values of induction B, and field is possible to consider approximately homogeneous.

Inside atmospheric vortex wall the energy flux is sharply, or almost instantly, increases and also instantly falls down at the wall outer side. This is supported by the numerous observations presented in [2]. In

electromagnetic vortex this corresponds to the sharp increase in magnetic field induction and its subsequent decrease with increasing in r. Figure 8.1 shows dependence of induction B in equatorial plane of electron core on distance r from electron rotation axis.

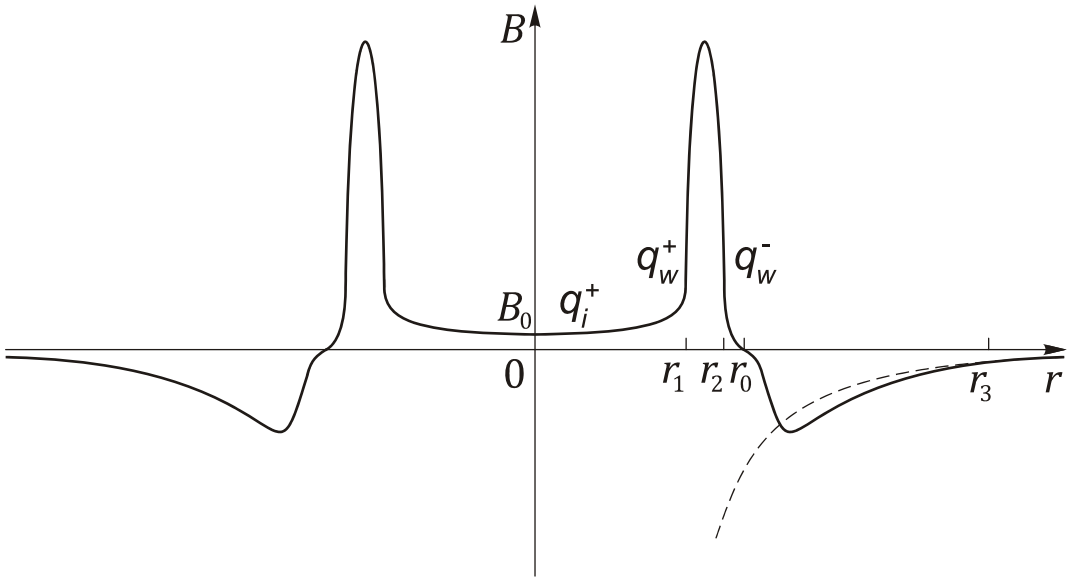

Fig. 8.1. Dependence of induction B in an equatorial plane of a core electrona from distance to a rotation axis electrona r.

It can be seen from the figure, which is purely qualitative, that in internal cavity of electron core induction B has low value and is almost constant within region from $r = 0$ to r_1. At the point r_1 it sharply increases and at the point r_2 it sharply falls and reaches zero at r_0. From r_0 to r_3 and beyond the induction is negative, i.e. the induction vector B is directed to the opposite side in relation to the induction direction at electron centre, or its core. The r_0 point is logical to choose as core interface. The point r_3 is characteristic in that the magnetic field induction there is close to that defined by expressions (6.17) - (6.19) [1] for point-like electron (dashed curve in fig. 8.1). Position of this point is impossible to define unequivocally, this position depends on an permissible coincidence error for that curves. The area from r_0 to r_3 is a transition area from electron core to its outer area described by the equations (6.17) - (6.19 [1].

Let's consider electric charges caused in electron core by magnetic field rotation.

1. Inside internal cavity of electron core magnetic field induction is possible to consider as approximately homogeneous. In this case the first term in the electric field divergence equation (7.14) [3] is equal to zero, since the rotor of magnetic field induction $\mathbf{B}$ is equal to zero. Then taking into account the relation (7.1) [3] between electric field strength divergence and charge density, it is possible to write down from (7.14) the equation for electric charge density q_i^+ in internal cavity of electron core:

$$q_i^+ = -2\varepsilon_0 \boldsymbol{\omega}\mathbf{B}, \tag{8.3}$$

where $\boldsymbol{\omega}$ – is angular velocity vector of electron.

Since $\boldsymbol{\omega}$ and $\mathbf{B}$ vectors are directed oppositely, the value q_i^+ corresponds to the positive charges which are in internal cavity of electron core, as follows from (8.3).

2. At the point r_1 on inner side of vortex wall the magnetic field induction gradient achieves its peak value. This case we have already considered in the paper [3]. The electric field divergence at this point as follows from (7.18), also achieves peak value. Hence, the distributed positive charge density q_i^+ also achieves peak value at the inner cavity interface of electron core. Then, substituting (7.18) in (7.1) we obtain following expression for electric charge density in the vicinity of vortex wall q_w:

$$q_w = -\varepsilon_0 \frac{\partial B_z}{\partial r}\left[\boldsymbol{\omega}\mathbf{r}\right]\mathbf{i}_\varphi - 2\varepsilon_0 \boldsymbol{\omega}\mathbf{B}, \tag{8.4}$$

where $\mathbf{i}_\varphi$ - is unit vector in cylindrical frame of reference.

Here the coordinate designation ρ in the expression (7.18) which has been written in cylindrical frame of reference, is replaced by designation r used in figure 8.1.

Both terms in (8.4), are positive, as follows from fig. 8.1. At the point where charge density is at its peak value the first term appears to be more or much more than the second one, but this is not significant for subsequent reasonings.

3. At the point r_2 on the vortex wall outer side the magnetic field induction gradient reaches minimum value and is negative. For this reason

the first term in (8.4) for vortex outer wall becomes negative unlike that at inner wall. Whereas the second term keeps its sign unchanged and becomes negative only if $r > r_0$, when sign of induction $\mathbf{B}$ is changed. It should be noted that points r_2 and r_0 may be very close or almost coincide to each other.

The first negative in (8.4) should be much more than the second positive term by magnitude, because electron core has net negative charge. For the same reason the charge density magnitude at the outer side of electron core wall q_w^- is more than charge density q_w^+ at inner wall. This is explained by two reasons. The first reason is that the formula (8.4) includes distance from electron axis r, which is different for inner and outer side, with $r_2 > r_1$. The second reason may be that the magnetic field induction gradient at the electromagnetic vortex wall outer side can be more by magnitude than that in inner side.

4. In transition region between r_0 and r_3 and beyond it charge density everywhere is negative, including wall outer side of electron core, changing in various points only by magnitude. At the point r_0 the minimum charge density can be observed up to zero value depending on presence or absence of inflection point on the curve shown at this point in fig. 8.1, and also on the inflection extent. Other features are obvious enough from the figure and expression (8.4).

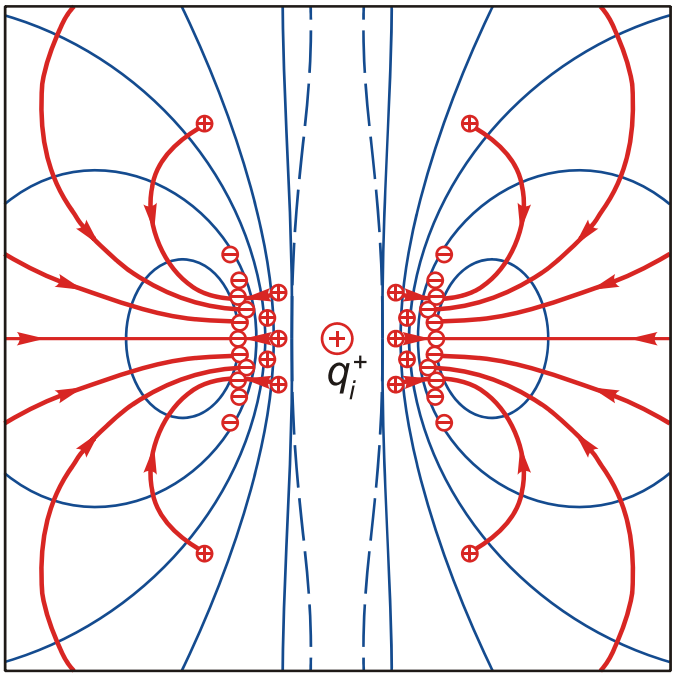

Fig. 8.2. Longitudinal section of electron core

- magnetic flux lines;
- electric flux lines;
⊕ and ⊖ positive and negative bound charges respectively;
⊕ - distributed positive charge with low density q_i^+ inside inner cavity of electron core.

Figure 8.2 shows axial cut of electron core.

In the center of electron core there is internal cavity where charge density is equal to q_i^+. The cavity width in figure, is most likely, strongly exaggerated in comparison with real relative size. Distributed small positive charge inside internal cavity of electron core, is designated by the big circle with a sign "+" in the center. This charge extends along whole core axis and comes into bound charge distributed along electron axis according to the equation (6.28) [1].

Bottom keen part on the vortex is observed when real atmospheric vortexes are in their formation stage, when the vortex has not yet reached earth surface, or in a final stage, when the vortex sometimes comes off terrestrial surface. On this basis vortex internal cavity is considered to be of spindle like form pointed from both ends. If that concerns also electromagnetic vortex the internal flux lines firstly are compressed at core interfaces as shown in figure 8.2 by dashed lines, and only then are dispersed. If it is so the curve of positive charge density q_i^+ dependence has two peaks at the points where the lines approach each other as much as possible. Otherwise this curve has one peak at the centre of electron core.

In radial direction from the centre attention attracts the double electric layer at the vortex wall interfaces. Negative charges, as seen in figs. 8.1 and 8.2, are at larger distances from the centre, but prevail in concentration what predetermines negative charge of electron core, which is equal to classical electron charge e.

8.3. Electron stability

Configuration of electric and magnetic fields will be steady when it corresponds to energy minimum. Various factors should be considered. Firstly, there is centrifugal force because electromagnetic energy circulates around electron and it has angular momentum. Secondly, there is unknown factor defining parameters of electromagnetic vortex. The vortex in gas or liquid may have various parameters, they may be huge or microscopic. At the same time the electromagnetic vortex can have only single charge value which is multiple e, - neither more nor less. Without this unknown factor it is impossible to prove electron core stability.

Therefore we see the problem not in *proving* electron stability, but in that *to show possibility* of its stability on the basis of theory of motion.

As mentioned above, for calculation of forces in core it is necessary to find configuration of core electromagnetic field, corresponding to energy minimum. We cannot do it because of absence of the mathematical theory quantitatively describing an electromagnetic field of electron core, but we can qualitatively describe the forces operating in core. With that end in view we try reduce the forces that act in the electron core, to the known forces of the electric and magnetic nature well studied in electromagnetic theory. We hope that the main forces inside core we have considered at least qualitatively.

Electric forces.

To do it for electric forces is easier, because we already have qualitative description of electric charge configuration in core. Using interaction forces of electric charges as a basis, we add this picture with description forces of other nature.

In radial direction positive charges in core cavity and at the core inner wall interact among themselves and tend to move apart. This is supported by centrifugal force acting, first of all, at the vortex wall. Charges at the inner and outer vortex walls interact among themselves and tend to compress wall. However, compression of the wall causes magnetic field, that forms the wall, to compress. Since magnetic field energy increases as field induction squared, the forces counteracting wall compression are sharply increased. Thereby the balance of radial forces of electron core is provided.

Two oppositely directed forces act in axial direction. High energy density in the electron central region tends to decrease by the increase in the axial size of the core. It is interfered by attraction between positive charge of core polar regions and whole electron and core charged predominately negatively. Nevertheless, the electric component of axial forces has, apparently, only minor value and is manifested itself basically in outer areas and beyond the core. This is indicated by axial character of core and distribution of positive charges.

Thus, we have shown possibility of balance between radial and axial forces in electron core and, hence, the possibility of its stability. Thereby we have shown that the described configuration of electromagnetic field of electron core *does not in contradiction* with physical laws. It is important element of the proof to the electron core hypothesis that was put forward.

Forces of magnetic nature.

The electron core structure is entirely based on analogy with vortex in atmosphere or a liquid. Stability of these vortexes is usually explained by

balance between centrifugal forces and forces of atmospheric or hydraulic pressure. We have shown above that for electromagnetic vortex there are preconditions for analogy with atmospheric vortex when only electric forces were taken into account, however these forces are not enough to explain large axial forces in electron core. We try to find this explanation using as a basis the account of magnetic field and forces of the magnetic nature.

With that end in view let`s consider electron core wall. All that mentioned above concerns not only wall of electron core vortex, but also relates to its inner and outer areas. However these phenomena will dominate at the electron vortex wall.

According to expression (2.8) [4], electric field intrinsic velocity at the vortex wall will be of high value since both magnetic and electric field have high values at the wall.

Such motion is a forward motion, otherwise electron would possess a magnetic charge since second term in expression (7.7) [3] would not be zero. The difference between field forward and rotary motion we have also considered in detail in paper [5] using rotating magnet as an example. What mentioned in [5] about field of the permanent magnet concerns also for the electric field, since each infinitesimal element of electric field at the vortex wall can be represented as elementary electric dipole, as for field of the permanent magnet, with the total field is not changed. In the forward motion of electric and magnetic field the rotor of velocity of this fields is equal to zero in inertial frame of reference.

It is logical to assume that *electric charges located at the ends of vectors (the ends of flux lines) move together with flux lines*, hence, oppositely directed electric currents exist at the outer and inner vortex wall surfaces. These currents are not caused by motion of free discrete charges, these currents are not caused also by the motion of the charges bounded to moving source of electromagnetic field. Motion of these electric charges bounded by their nature is caused by electric field motion in the crossed electric and magnetic fields. Thus, the energy flux existing in the limited volume and is defined by Poynting vector, is accompanied by motion of electric charges, i.e. by electric current in vacuum. Motion of these charges is forward motion so the rotor of velocity of electric field caused by the charges is equal to zero

This statement about motion of electric charges and, as consequence, about existence of electric currents, supplements principle of electromagnetic field motion and extends it to the electric and magnetic

bound charges and has hypothetical character, which requires substantiations like for any hypothesis.

Within the scope of present paper we only apply it to describe the structure of electron core, however it can be applied also for description of other electromagnetic phenomena and is quite accessible for experimental check. In the future papers we hope to concern this question in more details but now let`s return to electron core.

Currents that flow at outer and inner surfaces of vortex wall, are equal by magnitude (we remind that flux lines move forward) and are opposite by their directions (charge signs are opposite), only radiuses of circles along which these currents flow have little difference. For this reason the magnetic field in internal area of core is close to zero and is almost entirely concentrated in the region inside vortex wall. The magnetic field configuration in electron core is similar to the field of two coaxial solenoids with various radiuses and oppositely directed magnetic field with equal induction magnitude in the central region of solenoids. The forces, that act upon solenoid coils , are well studied. These forces, which are of magnetic nature, tend to compress the solenoid along its axis and to stretch in radial direction. The same forces work also in electron core.

Thus, the electron core is stable formation with system of mutually balanced forces. Radial magnetic repulsive forces are in balance with attractive forces in double electric layer. Axial magnetic attractive forces are counterbalanced by electrostatic repulsive forces from the charges of the same name in electron core.

This, undoubtedly, is simplified picture of electron core structure and force distribution in it. At my justification it is possible to say that another picture does not exist now.

8.4. Hydrogen atom

Another major element to prove electron core hypothesis is to explain those experimental facts which are not explained within the scope of existing theories. One of such facts is atom stability, since electron should fall on nucleus in accordance to classical concepts. The quantum mechanics in any way does not explain it, but only establishes the fact of stability and then this fact is accepted as one of axioms of quantum mechanics.

What happens, if instead the core centre where in figure 8.2 the sign “+” is shown, proton is placed? This can take place, under favorable conditions, by collision. Electric field of proton positive charge will break

balance and, pushing away positive charges of core cavity and in wall inner surface, will move apart the wall. This repulsive force in combination with centrifugal force caused by electron orbital rotation around atom nucleus, overcome attractive force of outer wall surface. We consider that as a result of collision the electron is appeared at the first circular Bohr orbit. The general configuration of electron core will remain unchanged, but scale and core proportions will be disturbed. Thickness of the wall is increased, its radius is increased to achieve electron orbit size, and all values of the field, electric and magnetic, are accordingly decreased.

Taking into account electron rotation round nucleus is possible to represent general configuration of the whole field system as follows.

Magnetic field of wall of the core rotating on electron orbit is uniformly "smeared" over the whole orbit. As a model of this magnetic field we accept field of the rotating permanent magnet which we have considered in paper [5]. Let`s divide all field of the wall (i.e. electron orbit) into elemental parts. Each such site is an elementary point dipole. We compare each such point with elementary magnet (electron), a part of the magnet in [5]. As it was mentioned in [5], each elementary magnet (electron) moves forward around rotation axis, while keeping invariable rotation around own axis. Our elementary parts absolutely similarly move forward around hydrogen nucleus, while keeping rotation round own axis irrespective of orbital velocity. Net field of such an electron "smeared" over the orbit is equal to the sum of the fields from separate parts of the orbit.

It is possible to present example from mechanics. The gyroscope located on the space rocket, changes velocity together with the rocket when orbit is changed, but all gyroscope rotation characteristics remain invariable.

Coming back to electron, this means mathematically that the rotor of electron magnetic field velocity in an orbit, remains everywhere invariable and equal to the doubled rotational angular velocity $2\boldsymbol{\omega}$, as for isolated electron (7.13) [3]. In this case electron charge remains invariable irrespective of its rotation on an orbit around hydrogen atom nucleus. This charge, more accurately, its centre is in the core centre, i.e. in an atom nucleus, and its position in electron rotation remains invariable. If the orbit is elliptic the atom nucleus and the charge centre remain in one of ellipse focuses and also remain motionless.

Such a model of hydrogen atom completely meets requirements of both classical, and the quantum theory. In fact, rotation of electron around atom nucleus represents itself stationary process, the field value in any

point of space remains invariable, and there is no energy loss by electromagnetic radiation in rotation. Thereby basic paradox of the Bohr theory is eliminated. The mechanical orbital moment is caused by circular energy flux at the vortex wall defined by Poynting vector. The vortex wall in this case is necessary to represent as electron orbit.

This electronic orbit represents itself a cloud, satisfying to the equations of quantum mechanics. In this case, however, physical interpretation differs a little from the quantum mechanics: this is real cloud of electromagnetic field. At the same time, if electron interacts with other objects it can be localized in various points of the orbit depending on interaction conditions, what quantum mechanics requires.

8.5. Electron magnetic flux

As shown above, the electron core is not point formation, hence, the magnetic flux penetrating core in internal area of electron and equal to magnetic flux with an opposite direction in its external area, is finite value. Let`s estimate this flux because there are no initial data for exact calculation. For such estimation we use that classical radius of electron should by the order of value be equal to the core interface radius r_0 on fig. 8.1, where the magnetic flux changes its sign. Otherwise the electron electric mass will be either much less, or much more than real electron mass. Calculations of magnetic flux Φ_e for core internal area are not obviously possible, because exact magnetic flux distribution function is unknown. Fortunately, magnetic flux value Φ_e in internal area is equal by magnitude to flux value in outer electron area, and magnetic flux distribution function in outer area is known (expressions (6,2) - (6,4 see), [1]).

In equatorial plane of electron the first expression, as well as the last, is equal to zero. Then expression for magnetic induction B in equatorial plane of electron outer part (6.3) becomes:

$$B = \frac{\mu_0 p_m}{4\pi r^3} \tag{8.5}$$

Here it is considered that in equatorial plane $\sin\vartheta = 1$, other designations in the right part of equation (8.5) are the same as in (6.3).

Dependence (8.5) is shown in figure 8.1 by dashed line. The real dependence represented by solid line in the region between r_0 and r_3 of the

curve before crossing of curves accept values, at the expense of redistribution of flux lines, which are less than that from dependence (8.5), and after curve crossing these values exceed them. Thus, in total magnetic flux calculation these distortions of dependence (8.5) are completely or at least partially compensated.

External electron magnetic flux is defined by the following expression:

$$\Phi_e = \int_{r_e}^{\infty} B(r)dS, \tag{8.6}$$

where r_e – is classical radius of electron, $B\ (r)$ is the dependence of induction on radius, defined by expression (8.5), and dS – is the area of ring of radius r and width dr:

$$dS = 2\pi r dr. \tag{8.7}$$

Substituting (8.5) and (8.7) into (8.6), we obtain after integration:

$$\Phi_e = \frac{\mu_0 p_m}{2r_e}. \tag{8.8}$$

Let's use the known expression for classical electron radius r_e (see, for example, [6]):

$$r_e = \frac{1}{4\pi\varepsilon_0}\frac{e^2}{m_e c^2}, \tag{8.9}$$

where e is electron charge, m_e is the electron mass, ε_0 – is electric constant, c – is velocity of light in vacuum.

Substituting expression (8.9) in (8.8) and taking into account that the electron magnetic moment p_m is equal to Bohr magneton,

$$p_m = \frac{e\hbar}{2m_e} \tag{8.10}$$

where $\hbar$ is Planck's constant, and also taking into account that $\varepsilon_0\mu_0 = 1/c^2$ and $\hbar = h/2\pi$, we finally obtain:

$$\Phi_e = \frac{h}{2e}. \tag{8.11}$$

In the obtained expression we recognize to the great surprise the formula for magnetic flux quantum. (The formula was firstly presented by F. London without factor 1/2 [7], the history of discovery of magnetic flux quantization is considered in detail in paper [8].) Surprising is not that the electron magnetic flux is appeared to be equal to magnetic flux quantum, something similar may be or even could be expected. More surprising is that the magnetic electron radius is appeared to be equal to such enough conditional value as classical electron radius.

Certainly, all that was said above (equality of electron magnetic radius to the classical radius and equality of electron magnetic flux to magnetic flux quantum) are only the assumption, but very convincing assumption, because matter is that the electron magnetic flux *is accurately equal* to magnetic flux quantum what is at issue. Such coincidence cannot be casual.

8.6. Summary

The model of electron core proposed in the present paper as core of an electromagnetic vortex is based on known properties of a tornado or another atmospheric vortexes. This similarity of the vortexes, atmospheric and electromagnetic, just explains the detailed description of its structure, probably excessive. Nevertheless, if above electron described in details may differ from real one, its basic lines, we hope, will prove to be true in the future. The basis for such hopes serve, besides general reasons, the following circumstances peculiar to the proposed model: finite electron mass, elimination of discrepancy with classical electrodynamics what takes place in Rutherford –Bohr model of hydrogen atom and also equality of electron magnetic flux to the magnetic flux quantum.

Simultaneously, proposed model of hydrogen atom agree well with quantum mechanics. The wall of an electron electromagnetic vortex in hydrogen atom is, as a matter of fact, an electronic cloud in the quantum

mechanics which submits to all its laws. Thus there are no any reasons to change something in quantum mechanics equations.

The major property of electronic vortex core that follows from the electron core model and hydrogen atom model is the ability to change scales. These scales can change from minimum dimension for free electron up to electronic orbit dimension for atomic shell electron, and, as will be shown later, even to the large macroscopic dimension.

Conclusions

1. The model of the electron central zone structure, or core, based on atmospheric vortex structure is proposed. This model allows to describe qualitatively configuration of electromagnetic field not only in outer electron zone, but also in core. It is noticed that electron with such core structure has finite mass.

2. The model of hydrogen atom is proposed, which is free of contradictions with classical electrodynamics and completely agree with requirements of quantum mechanics. The model is based on electron representation as electromagnetic vortex in centre of which there is an atomic nucleus.

3. It was shown that electromagnetic vortex that forms electron, has no fixed dimensions, they can change towards increase under the influence of external objects, in particular an atomic nucleus.

4. It was proven that the magnetic electron radius is equal to classical radius, and the electron magnetic flux is equal to magnetic flux quantum.

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