

The theory of electromagnetic field motion.

11. Electromagnetic ether

L.N. Voytsehovich

In present work twin paradox (clock paradox) is considered from logic positions. It is shown that the paradox is caused by that the mobile and motionless reference frames are accepted to be equivalent. The paradox disappears if one of the reference frames motionless relative stars is selected. It is shown that such a conclusion does not contradict Michelson experiment because in both systems all physical processes proceed equally. It is also shown that the physical reason of special role of reference frame which is motionless in relation to stars consists in motionless electromagnetic ether. The electromagnetic ether is full synonym to concepts of physical vacuum and dark energy in the phenomena of various scales. The electromagnetic ether in relation to electromagnetic waves is only environment in which they propagate, not their carrier, as for classical ether of the nineteenth century. Other properties of electromagnetic ether are considered. In particular, it is shown that ether is carrier of gravitational field. Connection between properties of the ether and some quantum phenomena is also considered.

11.1. Introduction

Michelson experiment has unequivocally shown that the ether does not exist. What, however, ether was meant by Michelson and its contemporaries? We name Michelson ether as its classical ether, it is the medium for electromagnetic waves. Oscillations of classical ether are just electromagnetic waves. Michelson experiment has convincingly proved that in the nature such an ether does not exist.

Further numerous attempts of ether revival were made and continue up to present time. The term ether has discredited itself in the professional environment. At the same time the idea of ether has actually revived also in the professional environment under terms of "physical vacuum" by consideration of the microworld phenomenon and "dark energy" for the phenomena of space scale.

We use generalizing term "ether" for the same phenomena and "electromagnetic ether" if necessary. Both terms are not original, but precisely reflect essence of the phenomena. In all cases they will be used as full synonym of terms "physical vacuum" and "dark energy" depending on scales of the phenomenon under consideration.

Present work is devoted to the theory of electromagnetic ether, to the description of its properties and to the proof of existence. Criterion of correctness of the description of properties of the ether is full conformity of these properties to the known and proved properties of physical vacuum, dark energy, and also to the basic conclusions of the special and general theory of relativity.

11.2. Electromagnetic ether

In the present subsection we show basic possibility of existence of electromagnetic ether and consider its basic properties.

The electromagnetic ether, as appears from its name, has the electromagnetic nature. The electromagnetic ether differs from classical one by that it is only medium where electromagnetic and all other physical processes proceed without any exceptions. Unlike other known environments (glass, water, etc.) the ether as a medium influences not only on dielectric permeability and velocity of light. The ether density influences also distance (the sizes of subject) and time course. The ether, as shown below, is the carrier of gravitational field. What represents ether itself?

The substance is the structured self-ordered electromagnetic field [1, 2]. Unlike substance, electromagnetic ether is unstructured chaotic electromagnetic field, the white noise which follows only to the statistics laws. The ether, as well as any electromagnetic field, possesses certain energy. At scales of the phenomena which are non microscopic, density energy is locally constant. Random character of field value manifests itself to the full extent in microscopic region of the phenomena, in particular, it causes tunnel phenomena and spontaneous decay of elementary particles. In cosmic scale the ether is known as dark energy. It is condensed near to all gravitating bodies, in particular, stars and galaxies. In subsection "Gravitation" gravitational properties of ether (dark energy) are shown in more detail.

Let's consider more detailed properties of the ether, being limited mainly by micro- and macroscales.

Let's assume that the electromagnetic ether exists, i.e. exist crossed electric and magnetic fields chaotically changing in time in a random way. The average value of the chaotic fields depends on size of considered volumes: the more the volume, the lower field value at the expense of averaging, and on the contrary. It, certainly, the known fact if existence of

physical vacuum is accepted, but it is important for us to show that it is also valid for electromagnetic ether.

Let's consider two small enough parts of the space, which are at some distance from each other. In any change of electromagnetic field configuration in one of parts it will be effected on the field configurations in the second part through time necessary to overcome by light the distance between these parts. Generalizing, it is possible to tell that the configuration of electromagnetic field on any small enough part of space depends on configuration of electromagnetic field at all parts observable Universe i.e. the Universe as it is seen at the moment of observation from the point of the observer. Squares of field values are summarized because direction of every component is random.

What will occur if near to our small part of space there is big enough gravitating mass? Parts of space in gravitating body are considered to be much smaller compared to sizes of its elementary particles so that the electromagnetic field of particles within the part under consideration will be uniform at any time. As shown in the previous works, all mass of elementary particle is electromagnetic in nature. As follows from results [2, 3] elements of particle field must come to chaotic motion under the influence of random field by electromagnetic ether (physical vacuum) when electric and magnetic field are crossed, while keeping mean direction along field lines of elementary particle. Unidirectional fields of vacuum and elementary particle are summarized as fields squared, that is in this case has no value that one of fields to be summarized is not random. Thus, from the viewpoint of influence on the parts which are close or not so removed from body, all parts inside body are energetically equivalent to the ether with higher energy density. Hence, there are areas of space with higher energy density of ether around any gravitating body, than in surrounding space at a great distance.

In work [2] we considered electric and magnetic field motion in a space. Let's consider what new is brought by the circumstance that the space represents itself electromagnetic ether using electric field as an example. In work [2] we did not concern the physical reasons why the expressions (10.24) and (10.26) for energy density w_e of electric field E differ from classical expression

$$w_e = \frac{\varepsilon_0 E^2}{2}, \quad (11.1)$$

where ε_0 is electric constant.

When field source (capacitor) moves in laboratory reference frame there are unequal conditions for longitudinal and transverse electric field components because there is anisotropy in properties of electromagnetic ether. This anisotropy is caused by that for the observer in laboratory reference frame, ether electric field longitudinal components of moving capacitor do not change in value whereas transverse components change according to Lorentz transformations. For this reason the interaction of ether with the electric field longitudinal component differs from that for transverse component.

Expressions (10.24) and (10.26) differ from expression (11.1) by additional factors $1/(1-V^2/c^2)$ and accordingly $1/(1+V^2/c^2)$. Here V is field source velocity, and c is electromagnetic constant. Now we enter designations

$$\varepsilon_{\parallel eff} = \frac{\varepsilon_0}{1-V^2/c^2} \quad (11.2)$$

and

$$\varepsilon_{\perp eff} = \frac{\varepsilon_0}{1+V^2/c^2}, \quad (11.3)$$

where $\varepsilon_{\parallel eff}$ is effective value of electric constant for longitudinal electric field components, and $\varepsilon_{\perp eff}$ is effective value of electric constant for transverse electric field components.

Then expression (11.1) can be extended to the case of moving electric field by replacing ε_0 by ε_{eff} :

$$w_e = \frac{1}{2}(\varepsilon_{\parallel eff} E_{\parallel}^2 + \varepsilon_{\perp eff} E_{\perp}^2), \quad (11.4)$$

where E_{\parallel} and E_{\perp} are the components of electric field directed accordingly along and transversely in relation to direction of motion.

Introduction of concept of effective electric constant allows to find physical substantiation to the increase in energy of the electric field

longitudinal component when it moves, in spite of the fact that field strength does not change. Additional energy is explained by the increase in effective value of electric constant $\varepsilon_{\parallel eff}$ for the field directed in parallel to the velocity of its motion, in comparison with constant ε_0 for motionless field. Accordingly for transverse component "surplus" in kinetic energy in comparison with kinetic energy of substance is compensated by reduction of effective value of $\varepsilon_{\perp eff}$ because $\varepsilon_{\perp eff} < \varepsilon_0$. Due to this compensation the equality of kinetic energy for electric and magnetic field and kinetic energy of substance is achieved as has been shown in [2] on the basis of purely logic reasonings.

The following interpretation of redistribution of energy in moving electromagnetic field is also possible. Kinetic energy of substance which as it was shown in the previous works, has purely electromagnetic nature, partially consists of energy of the additional electromagnetic fields caused by Lorentz transformations and is partially concluded in electromagnetic ether energy.

These reasonings are valid for any velocities, including sublight velocities. But all of them relate to the observer in conditionally motionless laboratory reference frame. The observer in moving reference frame (in the spaceship for definition) will not find out any changes in ether properties according to principle of relativity because all physical constants will change interactively. It would be emphasized on the other hand that this valid only for the local and isolated system because by means of an instrument or simply having looked out in window it is possible to find out red or violet displacement of star radiation spectra depending on direction to look relative to motion. At the same time such a displacement will not be observed in the reference frame which is motionless in relation to ether.

This circumstance is usually ignored. Strictly speaking, the observer in moving system has no possibility to define, whether he is in motionless reference frame or in reference frame moving with high velocity in relation to reference frame (laboratory), only if the laboratory is small enough (local reference frame, in which some nonuniformity of gravitational field may be neglected) and is completely isolated (there are no windows, full protection against space radiation is provided, there are no micrometeorites, the observer has no any possibility to register interstellar gas). In other words, in spite of the fact that all physical laws in all inertial reference frames are identical, only in idealized conditions the observer can confuse mobile and

motionless reference frame. The observer in such non local inertial frame like our Earth (with sufficient accuracy) is perfectly informed on the motion relative to the Earth, Sun and Galaxy stars.

11.3. Causality principle

In the previous subsection we have not proved reality of existence of electromagnetic ether, and have only shown possibility of its existence. Existence of electromagnetic ether allows to explain a number of the known facts without contradictions. Our primary goal is *to prove* reality of existence of the ether, using as a base known physical laws and logic reasonings. It can be made, as shown below, on the basis of twin paradox analysis. Preliminary, however, it is necessary to consider causality principle in details.

Causality principle underlies all scientific method of knowledge of the world. Usually the principle is used as something self-evident and obviously is not mentioned. One of few cases of its use in an explicit form is the proof of limiting value of velocity of the bodies which is equal to the velocity of light, otherwise it is possible to find reference frame in which the causality principle is broken.

Let's state some aspects of causality principle in that volume and form which we use in the further statement.

Any event has the reason or a number of reasons. In the case of single reason the causality principle can be used directly, thus usually any problems does not arise. If there are a number of reasons and the mechanism of their influence on the subsequent result is defined the logic laws are also applicable. If number of reasons is infinitely many and also mechanism of their influence is defined the statistics laws are applicable based in turn on logical laws.

As an example of infinite number of reasons are oscillations of electric and magnetic field at a given point (in given part) of electromagnetic ether. The field value at this point depends on total result of influence of all objects, including stars, cosmic dust and so on and, what is principal, from all points of ether (dark energy), i.e. from all observable Universe at the moment of observation. From such viewpoint the result of influence is quite determined. On the other hand, there is nothing more casual, than result of influence of almost infinite number of influencing objects (number of the reasons).

The special role in development of scientific method of knowledge, in particular in development of physics, plays mathematics. The mathematics manipulates abstract mathematical objects and is based on logical laws.

The mathematical theory not necessarily reflects any physical object or physical theory. The mathematical theory only *can* reflect any physical object, but also can reflect nothing. If on the basis of the empirical data it is possible to find certain conformity between mathematical and real physical objects a physical theory is originated. Such physical theory cannot conflict to the mathematical theory. If such a conflict nevertheless happens, the suggested conformity between mathematical and real physical objects has been wrong or the logic error has been made in the development of the physical theory. Anyway the logic paradox in the physical theory (as well as in any other theory) testifies with certainty the logic error made in the development of the theory.

11.4. Twin paradox

Example of similar paradox is the twin paradox (clock paradox) what is the deepest logic contradiction in the field of electromagnetism and the theory of relativity.

By depth of the logic contradiction the twin paradox is comparable to other known paradox about travel in time, paradox of the killed grandfather. It sounds approximately as follows. Time traveller comes back in the past and kills the native grandfather before he has got to know his grandmother. As a result the traveller could not be born and kill the grandfather. This paradox has simple solution: travel to the past is impossible.

Twin paradox is similar one. The first twin has departed by the spaceship, and then has returned on the earth. The second twin all time remained on the Earth. From the viewpoint of the second twin who has remained on the earth, it must be elder the first twin-traveller, and from the traveller viewpoint the all this is quite the contrary. Actually the second twin is certainly right, but this conclusion contradicts in relation to the conclusions of the special theory of relativity (STR) in its modern form that all inertial systems are equivalent.

Let's consider twin paradox in more detail, starting from reasons of logic contradiction occurrence.

The relativity principle says that all physical laws are invariants in relation to the choice of inertial reference frame. That is the relativity principle concerns only inertial reference frame, and the spaceship with the first twin moves with acceleration when rocket starting and retarding. On this basis one sometimes assert [4] that twins are in unequal conditions because the twin who has remained on the Earth, does not feel such

acceleration. Such statement is beneath criticism. First, as appears from the general theory of relativity, time course does not depend on acceleration. Secondly, the second twin instead of remaining on the Earth can make shuttle flights in little proximity to it, without reaching high velocity but at the same acceleration as the first twin. In that case the paradox will also remain in full. Time dilation occurs irrespective of acceleration and depends only on reached velocity.

To solve the killed grandfather paradox, we have to draw a conclusion that travelling to the past is impossible. Solution to twin paradox leads in similar way to a conclusion that the reference frame connected to the Earth and with stars fixed, is selected and absolutely motionless (space velocity of the Earth can be neglected in comparison to the velocity of light). There are no other variants of the solution since travel by the spaceship is obviously possible. But what is to be done with relativity principle?

The relativity principle sounds quite correctly and means that *physical laws in every inertial reference frame are identical*, but the principle of a relativity does not state that all reference frames *are equivalent*. We would like to note that such substitution of concepts occurs only in obtaining inverse Lorentz transformations by replacement of the dashed sizes by non dashed and vice versa (with replacement velocity sign from plus by minus). This trick with dashed areas is contrary to algebra laws, hence, contrary to logic laws, and hence, contrary to the causality principle. In such an operation there is substitution of principle «*in all inertial systems all physics laws are identical*» by principle «*all inertial systems are equivalent*». This replacement is made sometimes in explicit form what is directly underlined, and sometimes implicitly, but it is meant by sense. Both principles are often applied as equivalent and used as synonymous principles.

However these principles are similar only by the form, but there is a deep difference in essence between them. The first principle is causality principle in standard STR form and is valid not only for equivalent frames. It will be valid also in the case when one of inertial systems is selected but all physical phenomena in it proceed in the same way as and in any other inertial frames. From the viewpoint of the observer situated in this frames, all conclusions STR concerning moving inertial reference frame, remain valid, and, in particular, remain valid all direct Lorentz transformations. This relates to both the relativistic mechanics and electromagnetic theory. At the same time inverse transformations must be made in accordance to algebra laws and in doing so the twin paradox disappears.

Paradoxical in literal and figurative sense technique that uses replacement of the dashed values by non dashed ones is paradoxical not only in itself, but results, except twin paradox, to other paradoxes, less bright, less obvious, but not less in their significance. In view of smaller evidence in comparison with twin paradox they usually speak that STR does not submit to "common sense" laws. If under "common sense" the laws of logic and mathematics are meant any theory must obey to "common sense" laws, otherwise it is necessary to draw a conclusion that there is an error in theory.

But what about experiment since STR was confirmed by almost infinite number of experiments?

In all known experiments the observer always is located in motionless laboratory reference frame and has never been to moving reference frame. The reasons of this are clear. For the relativistic effects to become appreciable the observer must move with the velocity that comparable to the velocity of light that is technically impossible. Inverse Lorentz transformations have never been checked experimentally. Unique logically transparent mental experiment with twins leads to absurd result.

Absurdity of this result with inevitability, like the killed grandfather paradox, leads to a conclusion that the reference frame connected to conditionally fixed stars, is selected, absolutely motionless system. This property of immovability must have material basis, otherwise causality principle is violated – what the reference frame "knows" it is motionless from? Electromagnetic ether as physical vacuum or dark energy meets to the requirements of such a material basis, depending on scales of the phenomena under consideration.

Michelson experiment does not prove at all that the ether does not exist. It has proved that the physical phenomena in all inertial systems are identical, hence, *there is no classical ether as electromagnetic wave carrier*. The electromagnetic ether is not the electromagnetic wave carrier, it is only environment where electromagnetic waves propagate, and is not carry along by moving bodies in usual conditions (except for, apparently, conditions near to black holes rotating at high velocity and white dwarfs). Hence, the fact of existence of electromagnetic ether (dark energy) does not contradict to the results of Michelson experiment.

Thus, solution to the twin paradox leads us to logic conclusion about electromagnetic ether which is necessary to exist.

11.5. Gravitation

The major consequence and simultaneously the proof of existence of electromagnetic ether is gravitation and also uncertainty principle and accompanying effects. These phenomena have absolutely various scales but they are of common nature.

Let's consider gravitational interaction mechanism between bodies.

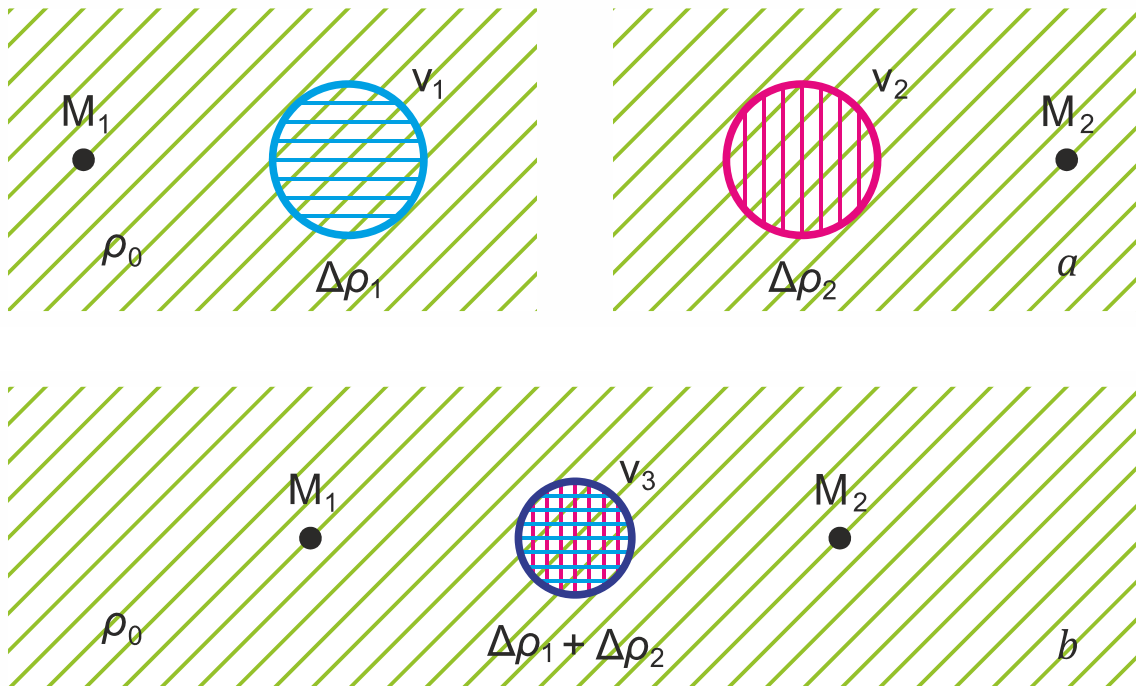


Fig. 11.1. Gravitational interaction mechanism between bodies
a - bodies M_1 and M_2 together with the allocated selected areas v_1 and v_2
 are spread on infinitely large distance;
b - the same, but the bodies approached each other to fully overlap selected areas.

Two massive bodies in an initial condition with mass M_1 and M_2 (fig. 11.1*a*), are at infinitely large distance from each other. Let's select small areas of space at large enough distance from bodies v_1 and v_2 with horizontal and vertical shading, as is shown in drawing. For the sake of clarity we consider mass of the bodies and their distances to the areas selected to be equal. Selected areas also have the identical form and are equal in sizes: $v_1 = v_2 = v$. Slant hatching in the drawing designates electromagnetic ether with energy density ρ_0 without the additional energy brought by massive bodies. Inside selected areas this energy $\Delta\rho_1$ and $\Delta\rho_2$ is

taken into account and designated by horizontal and vertical hatching respectively. This additional energy is summarized with energy of non disturbed ether ρ_0 . Summation of energy density occurs by following reasons.

Since magnitude and direction of electric and magnetic fields of non disturbed ether and all gravitational additives are random the squares of fields must be summarized, and field squared, as it is known, see, for example, (11.1), is proportional to the energy density.

In view of symmetry of the problem the following equalities for energy density are valid: $\Delta\rho_1 = \Delta\rho_2 = \Delta\rho$. Then the total energy u_1 , additional in relation to energy of non disturbed ether, is equal to the sum of energy in both selected areas

$$u_1 = 2\Delta\rho v. \quad (11.5)$$

Now let's pull together both bodies to fully overlap selected areas, as shown in drawing 11.1*b*. The energy density in area v_3 is equal to $2\Delta\rho$ according to random variables summation laws as it was mentioned above. Then energy u_2 , additional in relation to energy of the ether, is equal

$$u_2 = 2\Delta\rho v_3. \quad (11.6)$$

As it is known from the general theory of relativity (GTR), $v_3 < v$, and $u_2 < u_1$, i.e. total energy at overlapping selected areas is less than the sum of energies of selected areas before their overlapping. In other words, gravitational energy of bodies decreases in their approaching.

It is possible to implement total space integration of gravitational additives for cases *a* and *b* on fig. 11.1 taking into account gravitational shrinkage in length and to find total gravitational energies of remote and pulled together bodies with energies U_1 and U_2 respectively. The difference of these energies is also gravitational energy U_g as it is understood in the classical mechanics:

$$U_g = U_1 - U_2. \quad (11.7)$$

Certainly, the mass of bodies M_1 and M_2 can be essentially different what does not change anything. In particular, one of bodies, M_2 for example,

can be much less than M_1 . Then body M_2 may play role of a probe body. In this case it is possible to say that probe body M_2 will be accelerated if ether density gradient at the point of its location is distinct from zero, irrespective of the reasons of the gradient to occur. These can be one or several massive bodies or other reasons considered below.

It would be noted that the energy value of non disturbed ether ρ_0 we not used in reasonings. If we set energy density of non disturbed ether ρ_0 equal to zero as it usually made for gravitational potential related to ρ_0 anything would not change. It is clear for gravitational potential because it can be defined only to within a constant. But apply this to energy density of non disturbed ether is impossible because it will be impossible to speak about additional energy brought by gravitating bodies if it was not taken into account. This energy density of non disturbed ether must be equal to the density of dark energy in our Galaxy, but can differ a little in other areas of the Universe.

All necessary mathematical apparatus of the gravitation theory has already been developed for a long time, this is the general theory of relativity. In GTR the gravitation phenomenon is explained, simplifying a little, by space curvature. But, as appears from shown above, space curvature and gravitation itself are consequences of electromagnetic ether nonuniformity (dark energy) close to gravitating bodies. Since this relation between ether nonuniformity, space curvature and gravitation is unequivocal, as two consequences of a single reason, replacement of the reason of gravitation, by space curvature or nonuniformity of ether energy density, does not lead to contradictions.

Other reason of ether nonuniformity is the acceleration of bodies. Let's consider the most probable mechanism leading this nonuniformity to occur.

If the body is at rest in any inertial reference frame, in particular in instantly accompanying reference frame in the acceleration motion of a body all body energy is contained in electromagnetic energy of the substance of the body. If the body moves in such an inertial frame, what was noted in the end of subsection 11.2, additional kinetic energy is concentrated partially in arising fields according to expressions (2.3), (2.5) [3], and partially is in the form of ether field energy. From the viewpoint of the gravitational phenomena under consideration both these components are equivalent because they are summarized with each other as sum of their squares by laws of summation of random variables.

Let's consider two instantly accompanying reference frames S_1 and S_2 at the time moment $t_1 = 0$ and after infinitesimal time increment $t_2 = dt$. At the time moment t_2 reference frame S_1 moves in relation to frame S_2 as the body accelerates and passes infinitesimal distance ds during time dt . At time moment t_2 , as well as at any time, in accompanying frame S_2 additional infinitesimal kinetic energy du is equal to zero because the body is at rest in reference frame S_2 . But in reference frame S_1 , according to the observer in system S_2 , such an additional energy du (energy density) exists, because the reason, which is the motion of the body, precedes consequence, i.e. energy disappearance du . Hence, there is also energy density gradient of an additional field of electromagnetic ether du/ds , and this gradient has final value, in spite of the fact that du and ds are infinitesimal. This conclusion is valid irrespective of character of acceleration, linear or centripetal. In general, it is impossible to identify cause of the acceleration in the local closed reference frame - the accelerated motion or gravitational influence because it is impossible to identify the source of electromagnetic ether energy density gradient in the local closed reference frame. In all cases the body which, as we know, has electromagnetic nature is accelerated when it is placed in area of space where there is nonzero electromagnetic ether density gradient.

11.6. Microgravitation and uncertainty principle

Electromagnetic ether energy density gradient can arise not only under the influence of gravitational mass or the acceleration of bodies. Ether density gradient (physical vacuum) can arise in very small volumes as fluctuation of its density owing to stochasticity of electric and magnetic field oscillations of the ether. As we remember, it is difference of ether density gradient from zero is the reason of gravitational phenomena. Influence of ether density fluctuations depends on size and mass of a probe body. Electron is better suitable for a probe body in view of its small mass and size. In tunneling the energy of probe body does not change, because energy increase on the average is equal to zero due to random nature of the process. The tunneling effect is well studied and widely used in technology.

It is important to underline that microgravitation is under consideration instead of purely electric phenomenon in spite of the fact that

electric charges must arise as a result of fluctuations. Forces of purely electric nature must exist, but they are considered to be a component of microgravitational forces. In that case the separate accounting of electric forces would lead to their repeated accounting. This is indicated by the fact that uncertainty in position of small bodies (elementary particles) takes place irrespective of presence or absence particle charge.

Fluctuation of energy density of an ether results in not only occurrence of microgravitational forces, but also, according to conclusions of GTR, to the fluctuation (uncertainty) of length and rate of time course because they depend on gravitational potential (whereas we consider ether energy density). It is manifested itself in very small volumes, whereas when volume increase this uncertainty decreases at the expense of averaging and, eventually, disappears. Uncertainty is found also for momentum and energy, the physical values associated with length and time. Thus, we naturally come to Heisenberg uncertainty principle. It would be noticed that though this principle is connected with measurement procedure, it is not reduced to this procedure, it is the real-life uncertainty caused by random nature of electromagnetic ether fields (physical vacuum). This uncertainty is caused by influence of infinite quantity of the reasons. The number of these reasons includes influence of all objects of the Universe at the moment of observation: the stars, all solid bodies of the Universe, cosmic dust and, what is the most important thing, all Universe electromagnetic ether (dark energy), including thickening of the ether near to galaxies and black holes. All these objects contribute to ether energy density to the area of space we selected and study.

Thus, the hypothesis of existence of electromagnetic ether allows explain naturally gravitation, inertial phenomena in accelerated reference frames, and also Heisenberg uncertainty principle and tunnel effect. Any space event, such as tunnel transition or spontaneous decay of a particle, is simultaneously strictly determined and absolutely casual. If small volume is selected where there is an unstable particle, and all initial and boundary conditions are set for this volume the particle disintegration can be accurately predicted. But to set these conditions, it is necessary to consider, as it was marked earlier, infinite quantity of the reasons (in the nature there is nothing more infinite) what is essentially impossible. From this viewpoint phenomenon of particle decay is absolutely casual.

11.7. Conclusions

The hypothesis of electromagnetic ether appears to be very fruitful. It allows to explain, on the one hand, twin paradox (hours), the physical reasons of gravitation and uncertainty principle and its consequences. The fact of existence of electromagnetic ether is in complete accordance to known properties of physical vacuum and dark energy, which are the synonyms of ether. Besides, introduction of electromagnetic ether does not affect in any way known laws of the special and general theory of relativity. The exception is the inverse Lorentz transformations which must be obtained from direct transformations using algebra laws. It would be noted that inverse Lorentz transformations, unlike direct ones, have never been checked experimentally because of impossibility of such experiments by technical reasons.

On the other hand, full compliance between electromagnetic ether and known theories and the experimental data and possibility to develop physical model of the phenomena of special and general theory of relativity allow raw a conclusion on validity of electromagnetic ether hypothesis.

Important point is also that there are the additional bridges connecting the phenomena of the quantum and nonquantum physics as it was in description of electron properties in work [1].

Summary

1. Hypothesis is stated about existence of electromagnetic ether which represents stochastic process of fluctuations of electric and magnetic fields. The fluctuation value is defined by total influence of whole substance, electromagnetic field and electromagnetic ether of all observable Universe at the moment of observation.

2. Logic analysis of twin paradox (clock paradox) is made. As a result of the analysis it has been shown that the paradox does not exist if one of reference frame, which is motionless, is the selected, special reference frame related to fixed stars. Motionless electromagnetic ether can be physical basis of such selected system only.

3. It is shown that electromagnetic ether is carrier of gravitational field and the physical mechanism of gravitational field is considered.

4. Connection between electromagnetic ether and Heisenberg uncertainty principle is considered. It is shown that uncertainty in position of an elementary particle (electron) and, in particular, tunnel effect is

caused by the local forces which have stochastic character and being gravitational by the action mechanism.

References

1. L.N. Voytsehovich, The theory of electromagnetic field motion, 6. Electron, 2, (2013), p. 3. www.science.by/electromagnetism/rem6eng.pdf.
2. L.N. Voytsehovich, The theory of electromagnetic field motion, 10. Energy of electromagnetic field motion, 2, (2013), p. 70. www.science.by/electromagnetism/rem10eng.pdf.
3. L.N. Voytsehovich, The theory of electromagnetic field motion. 2. The principle of electromagnetic field component motion, 1, (2013), p. 12. www.science.by/electromagnetism/rem2eng.pdf.
4. К Мёллер, Теория относительности. Москва, Атомиздат, (1975), с. 208 – 212. (C. Møller. Theory of Relativity, Oxford, Clarendon Press, 1972).

*Article is published on REM journal site
On July, 1st, 2014*