To a problem on limitation of a field of application classic mechanics

The reduced and processed version [1]

Nikolay NOSKOV
Translated from Russian by Jury SARYCHEV

There is drawn a conclusion about existence of a phenomenon of longitudinal vibrations of moving bodies in fields of forces. The Longitudinal oscillations in motion of bodies (on a course of motion) result from non-uniformity of the retarded potential. This conclusion is logical development of Newtonian mechanics, due to introduction to it of principles of a short-range interaction.

Introduction

In the beginning 20 centuries in physics happened events, which one strongly changed its contents. There were two reasons lying in the ground of these events.

The first reason was that all attempts to be out from empiricism of a classic mechanics and from its logic of construction have appeared unsuccessful. In spite of the fact that the researchers were not satisfied with impossibility of extract directly from this theory neither principles of a short-range interaction, nor mechanism of gravitation, nor properties of world medium, with which one all this connected.

Attempts to be pulled out from rigid frame of a classic mechanics within the framework of the definite rules have resulted in occurrence of its several versions constructed on the basis of different sets of initial principles. From that one three principles were constant: Euclidean space, Newtonian time and law of conservation of mass. It is a power mechanics of a Newton – Euler – Laplace. It, so-called field mechanics, based on a principle of least action of Mopertuy, Euler and Lagrange, on an energy conservation law of Lagrange, Hamilton, Jacoby and Ostrogradskiy. And, at last, it is a forceless mechanics of Hertz.

The second reason was, that the researchers, as it seemed them, could not explain facts and natural phenomena were detected in frameworks already constructed classic mechanics. It also has formed the basis for origin STR, GTR and quantum mechanics.

However STR and GTR based on such postulates, which one could not be compatible with existence of world medium and, furthermore, space, time and mass jointed in interdependent essences start to be distorted by speed of bodies.

Refusing ideals (world outlook concepts) of classic mechanics, namely: Euclidean space, unified universal time and law of conservation of mass, which one are fundamental world outlook categories of materialists, lead to the sharp protest of the researchers and philosophers, which one adhered and adhere of the materialistic concepts. For this reason there was an acute scrambling against STR and GTR, which one does not cease for one second since these theories arose. However apologists of the relativistic theory managed to capture dominating positions in scientific establishments, where they have taken advantage to the full.

Probably, only it can explain the fact that the experiment on optician of moving mediums conducted before and after appearance of STR, were used partially, only in that part, where they do not contradict STR. Or they were given only formal relativistic explanation, which one, as a rule, is not founded on causality and on common sense.

However it is possible to state following now:

Researches of rotatory effect conducted by Garris in 1912 [2], Sagnac in 1913 [3], Michelson and Gel in 1925 [4], Pogany in 1926 [5], simply prove, that the ether exist. In this occasion S. Vavilov, ex-president ASc.USSR, has noted [6], «If the phenomenon of Sagnac was discovered earlier, than the zero outcomes of experiments of the second order were found out, it, certainly, would be considered as the brilliant experimental proof of an ether (is selected by me – N.N.)». It is only to be surprised: why «would be considered», instead of is considered?

Experiments on a dragging of an ether by moving mediums, conducted by Fiseau in 1851 [7], Heck in 1868 [8], Michelson and Morly in 1886 [9] and Zeeman in 1914 [10], have shown, that there is a partial dragging of ether

(and, therefore, ether takes place to be). Experiments verify a hypothesis of the Fresnel [11], who inferred, that the drag coefficient is equal:

$$k = 1 - 1/n^2, \text{ where:} \quad (1)$$

k – drag coefficient of the Fresnel.

n – factor of refraction of medium.

Michelson experiments 1880 ÷ 1929 [12], Michelson and Morley 1887 [13], Morley and Miller 1904 ÷ 1905 [14], Miller 1921 ÷ 1925 [15] display, that there is a partial dragging of an ether by the Earth, which one makes more than 90%, but less than 100% on its surface.

Moreover, Miller`s experiments have shown, that the partial dragging of an ether decreases with increasing of an altitude above surface of the Earth.

Besides, discovery of a phenomenon of a stellar aberration by D. Bradley in 1725 [16], Remer`s observation in 1675 [17] on non-uniformity of periods of eclipses of Jovian satellites at removal and approach to Earth and Sagnac`s phenomenon have shown, that the speed of light adds with speed of the receiver (when a partial dragging of an ether by the Earth or installation in experiment does not introduce the appreciable contribution) on a classic addition formula of speeds.

So far as STR 1) is incompatible to the fact of existence of an ether and 2) is based on a relativistic addition formula of speeds of light and receiver (speed of light does not add with speed of the receiver), it is necessary to recognize, that it contradicts experiment. Its conclusions, specially in a part of interdependence of invariants, their «bending» near to mass and from speed, transformation of mass in its property – energy and on the contrary, is simple non-scientifically and, therefore, are unauthorized. Waiving them also is required.

The second theory, GTR, claiming on a role of the theory of gravitation, has kept away from causality of physical phenomena still more. It represents a set of equations and special section of mathematics, in which one there is no place physical sense not only, but also common sense in general.

Both these theories STR and GTR not only were not set by the purpose of finding of dynamics of interactions on the basis of a short-range interaction

and existence of terminal velocity of interaction, but also have put barrier to development of such theories.

Waiving the relativistic theories is made in offered article. And the theory of a Newton – Euler – Laplace is developed by a method of introduction in it of principles of a short-range interaction.

Outgoing from the requirement of a short-range interaction...

If to consider the law of universal gravitation with the materialistic positions it gives the hint to the researchers that between gravitating mass through space the information on their value and about change of distance between them is permanently transmitted.

$$F = \gamma m_1 m_2 / R^2, \tag{2}$$

For corresponding of the transmitted information to values of masses, it is necessary, that the bearer of information would be somehow connected to mass; that the bearers of information from each body exchanged in space by the information and returned one to its gravitating bodies. At last, bearer of information should be a propulsive body of an mechanism of gravitation.

The theory of the mechanism «of sources – drains of an ether» by Riemann [18], Pearson [19] and Shott [20] corresponds to such requirements. Besides, this theory naturally explains a dragging of ether by bodies, which one in this case should depend on value of mass, and existence of an ethereal lens curving a course of light rays near bodies. The conclusion about finiteness of speed of interaction is especially relevant, which one is connected to properties of transmitting medium that is a major property of a short-range interaction.

The theory «of sources – drains of an ether» can indicate the reasons of motion of bodies in space. The process of formation of a matter in space should be, presumptively, outcome of fluctuations of pressure in ether. Then, the gradual disintegration of a matter into ether expiring in space, is a reason of interaction, which one predetermines, in turn, causality of motion and observance of the laws of preservation of energy of a momentum and mass. Therefore, motion of electrons and planets on orbits is not perpetuum-mobile, but the natural physical process passing with an expenditure of energy, having of its regularity and finite time.

Properties and laws of a short-range interaction

The theory of screens [21], pulsation [22] or «of sources – drains of an ether» are the mechanical theories of interaction. They imply clear obvious reasons of transfer of potentials on distance by means of intermediate medium depending on certain initial properties of bodies and medium itself (a screen, oscillation or disintegration of matter). In the first case there is a difference of impulses returned by medium to interacting bodies from their external and internal parties. In the second and third cases there is an low pressure in an interval between bodies, which one causes them to approach.

The transmission of action on distance by a material medium from a point to a point with certain velocity dependent on properties of this medium is called as a short-range interaction. Time of interaction, speed of interaction and relation of force of interaction to a relative velocity of interacting bodies characterize the short-range interaction.

The necessary time for full change of a potential in a point, connected with a trial body, from the moment of a beginning of its motion is named *the time of interaction.*

The speed of interaction is connected to properties of the transmitting interactions medium and, besides, depends on processes (dynamics) happening in medium at interaction. In theory of Newton – Euler this problem was not considered behind absence both test data and theoretical elaboration. STR and GTR have limited themselves of the greatest possible speed of bodies, equal speed of light in vacuum. Moreover, it was not connected with speed of interaction, and was declared only on the basis of mathematics.

Conducting analogy to a speed of sound, taking into account, that the power transmission (impulse) is possible through air only with a speed of sound, the speed restriction of bodies in air by this speed is right in the event if the body has no a jet engine. From here follows those concepts: the greatest possible speed of bodies and speed of operation on distance via medium are different phenomena.

Relation of force of interaction to a relative velocity of bodies, on a line by their connecting, are considered in this work below in connection with transac-

tions incorrectly called (Helmholtz) «by school of a long-range action», Gauss became founder of which one [23].

From positions of the laws of a short-range interaction, laws of the retarded potential actually are laws of dynamics of interactions. It is possible to state that law of universal gravitation (2) and Coulomb's law for electrical interaction is statics of gravitational and electrical interactions. But they are incorrect for moving masses and charges relatively one another.

As to a Coulomb's law, it was generalized on speed of interaction by the several researchers, due to what there are some kinds of electrodynamics: of Gauss, Weber, Clausius, Ritz, Riemann, F. Neumann, K. Neumann, Grossman and other. However only law of the Weber [24] meets an experimental and empirical electrodynamics created by researches of Oersted, Arago, Ampere and Faraday.

Subsequently, relativists have declared the formula STR based on a factor of the Lorentz as a true electrodynamics, because the electrodynamics of the Weber did not respond a general relativity. It became possible due to the factor of the Lorentz close enough described an electrodynamics on large speed range. However hereinafter they have taken self-deception, asserting that the relativistic laws of motion of fundamental particles on accelerators are correct down to 0,9998 speed of light. The matter is that speed of particles is determined through a factor of the Lorentz from the retrieved energy. It is difficult to dispute with relativists how correctly they determined the energy of accelerated particles (I, for some reasons, is not bent to trust to relativists). The careful researches are indispensable for this purpose. However it is possible with confidence to assert, that if the laws of the retarded potential were applied to definition of speed, its calculated value would be much lower, that, probably, corresponds to a reality.

Gerber generalized the law of universal gravitation on speed of interaction in 1898 [25]. The displacement of perihelion of planets, calculated by this law, correspond observable. Besides, the law of graviodynamics explains justice of a law of universal gravitation for a circular orbit, as the derivative of a scalar value of distance between planets (on a line them connecting) enters in it, which one is equal to null at a circular orbit. The derivative is value of the sec-

ond order of smallness at the elliptic orbit (and is responsible for an abnormal perihelion displacement).

Thus it is possible to state, that the main basis of origin GTR, abnormal perihelion displacement of a Mercury and other planets, moving at elliptic orbit, was explained and described by the law within the framework of a classic mechanics 17 years prior to origin of a relativism.

The form of the law of the retarded potential depending on a hypothesis of the mechanism of interaction

Let's consider the retarded potential on an example of the screen mechanism of interaction.

Two bodies of masses M and m were in rest relatively one another apart R. Shielding moving particles of world space (ether) relatively one another, the bodies start to interact, or to be attracted. Velocity of the bodies approchment is dR/dt. At change of distance between bodies on value ΔR the value of screening will change, but the particles of ether under new conditions of screening should overcome distance $(R - \Delta R)$. If the particles have speed U it is possible to consider the speed of particles of ether as speed of interaction. For an occurring of these particles with a body from a new screen, the value of which one depends on R and m, it is necessary to expend time, which one is named as time of interaction t_{int}:

$$t_{\text{int.}} = \frac{R - \Delta R}{U} - \frac{\frac{dR}{dt} \cdot t_{\text{int.}}}{U} \tag{3}$$

Considering, that the theory of screens describes Newton's potential, we can consider, as the force of interaction on the distance has changed

$$R_1 = R - \Delta R - \frac{dR}{dt} \cdot t_{\text{int.}} \tag{4}$$

If the speed of interaction was instantaneous, the force, operating between bodies at distance R_1, would be:

$$F_1 = \frac{\gamma Mm}{R_1^2} \tag{5}$$

However at terminal velocity of interaction we see, that on this distance (R_1) the screening acts at ($R - \Delta R$), i.e.:

$$F_1' = \frac{\gamma Mm}{(R - \Delta R)^2} \tag{6}$$

Therefore, the difference between real force and a law of universal gravitation, not taking into account retarded potential, will be:

$$\Delta F = \frac{\gamma Mm}{\left(R - \Delta R - \frac{dR}{dt} t_{\text{int.}}\right)^2} - \frac{\gamma Mm}{(R - \Delta R)^2} \tag{7}$$

Or, at $\Delta R \to 0$:

$$\Delta F = \frac{\gamma Mm}{(R - \dot{R} t_{\text{int.}})^2} - \frac{\gamma Mm}{R^2} \tag{8}$$

Now let's imagine two bodies having masses m and M and interacting on the scheme of theory of «drains of an ether». Each fundamental particle forming these bodies releases in world space of a particle of ether. The total number of particles of ether, released by a body, in this case is proportional to masses of bodies. Quantity of particles which are flying through unit of a spherical surface, encompassing by a body, changes according to the law of reverse squares:

$$n = \frac{N_1}{S(R_1)} = \frac{k_1 m}{R_1^2}, \text{ where:} \tag{9}$$

N_1 – total number of particles of ether emitted from m_1;

$S(R_1)$ – area of a spherical surface at distance R_1 from center;

m_1 – mass of a body;

k_1 – proportional ratio;

n_1 – quantity of particles which are diving through a unit area.

For the second body we have:

$$n_2 = \frac{N_2}{S(R_2)} = \frac{k_2 M}{R_2^2}, \text{ where:} \tag{10}$$

$R_2 = R - R_1$, where R – distance between bodies m and M.

The distribution of quantity of emitting particles of ether in space can be represented by graph of curves from (9) and (10) (fig. 1). In each unit area in an interval between bodies an altitude of a shaded site in a fig. 1 marks quantity of met particles. We can see that the shaded area is proportional to quantity of particles met in an interval between bodies.

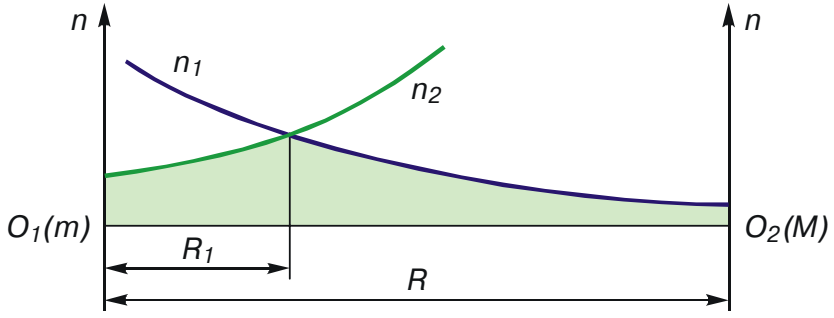

Fig. 1.

So far as the amount effect of interaction in the offered theory «of drains of an ether» depends on number of met particles of an ether, the force of interaction can be determined by the area of a shaded part in a fig. 1:

$$F(R) = \left(\sum_{R}^{0} N \right) k = \int_{R-R_2}^{R} \frac{km}{R_1^2} dR + \int_{R-R_1}^{R} \frac{kM}{R_2^2} dR \text{, где} \tag{11}$$

k – proportional ratio;

$$R_1 = \frac{Rm}{m+M}; \tag{12}$$

$$R_2 = \frac{RM}{m+M}. \tag{13}$$

Having made necessary transformation (11), it is possible to receive the formula of a view of a law of universal gravitation:

$$F(R) = \frac{kmM}{R^2}. \tag{14}$$

However this law is law for fixed bodies relatively one another.

At free fall of a trial body m on fixed M during interaction t_{int}, the body m will overcome distance l_1 (fig. 2), which one we shall call as *length of interaction*.

The body m on length of interaction l_1 will not experience change of force of interaction because of the retarded potential, as far as its carriers, exchanging by the information, were not in time yet to inform it up to it.

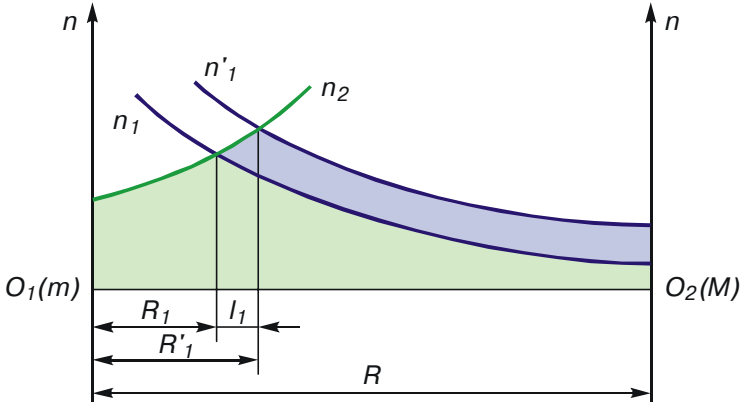

Fig. 2.

In a fig. 2 it is visible, that the time of interaction adds of two times: time of interaction on a section R_1, when the potential does not change absolutely (in relation to fixed bodies), and time, when the potential on a section from R_1 up to R varies uniformly. Thus the full change of a potential is proportional to the doubly shaded area.

If the time of interaction was instantaneous, the force of interaction would change proportionally to shaded site. At final value of speed of interaction this part of a potential starts to exhibit itself only after time of interaction, i.e. it delays, therefore we shall call it as *retarded potential*.

As it is visible in a fig. 2, the retarded potential is distributed uniformly on distance $R_2 = R - R_1$, therefore, for its full implementation on a body m, the time equal to $t_f = (R - R_1) / U$, (where U – speed of interaction) is necessary.

On the other hand, the more speed of a trial body m, the large width there is doubly shaded site in a fig. 2. Therefore, it is possible to enter proportionality of the retarded potential in unit of time from speed. And it is just what Paul Gerber has made in 1898.

Having taken a Newtonian potential:

$$V_0 = m_1 m_2 / r, \tag{15}$$

having substituted distance instead of r, which one should be passed by a retarded potential from m_1 to m_2:

$$r_1 = r - \Delta r = r\left(1 - \frac{1}{v}\frac{dr}{dt}\right), \text{ where:} \tag{16}$$

v – spread rate (of interaction);

and also having entered proportionality of delay in unit of time from speed, which one has appeared equal to

$$\left(1 - \frac{1}{v}\frac{dr}{dt}\right), \tag{17}$$

he has received expression for a potential

$$V = \frac{m_1 m_2}{r}\left(1 - \frac{1}{v}\frac{dr}{dt}\right)^{-2}. \tag{18}$$

Having substituted it in a standard equation of Lagrange

$$F = \frac{dV}{dr} - \frac{d}{dt}\left(\frac{dV}{dr}\right), \tag{19}$$

he has received the law of graviodynamics containing three units, similar law of an electrodynamics of Weber:

$$F = -\frac{m_1 m_2}{r^2}\left[1 - \frac{3}{v^2}\left(\frac{dr}{dt}\right)^2 + \frac{6r}{v^2}\frac{d^2 r}{dt^2}\right], \tag{20}$$

Thus, here is convincingly showed that the Gerber law is derived from conceptual reasons. And as far as the most relevant application of such law is the explanation of displacement of perihelion of planets, it is possible to state, that the law of Gerber meets causalities and cognition, that cannot be told about theory of relativity.

The scheme of interaction of a trial body at free fall in a field of a central force. An inference about longitudinal vibrations of a trial body

For detection of the laws of motion of bodies in fields of forces taking into account retarded potential we shall consider free adiabatic falling of a trial body in a field of central forces of a massive body.

Space is Euclidean, i.e. the distances and time are absolute. Space is three-dimensional, uniform and isotropic. The kind of interaction is taken gravitational. It is possible to consider a beginning of coordinate system fixed, in view of great mass of a body M, with which one these coordinates are connected.

The sequence of process of interaction of a trial body with massive is body showed in a fig. 3.

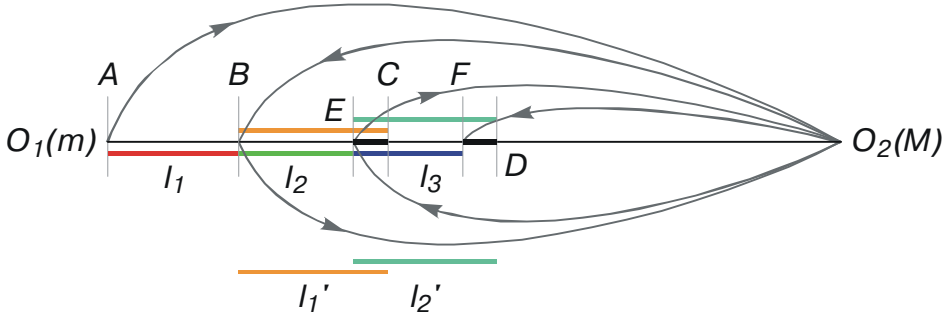

Fig. 3.

The trial body of mass m, starts to drop from a point A with initial velocity $v = 0$ on a body M under influence of Newtonian force (2): $F_1 = \gamma mM / R_2$.

The is increase of force $F_1 = \gamma mM / (R - l_1)^2$ occurs during the time t_{int2}.

It is shown on graph in a fig. 2. The trial body will be transferred from a point B to C (fig. 3). Increasing of strength happens starting from a point B (arrival of a retarded potential), stipulated by change of distance between bodies from a point A up to B. Increase of strength during time will be prolonged as much, as many time the trial body moved from A up to B.

The time of interaction can be connected with distance R and speed of interaction as follows. According to the considered earlier mechanism of interaction «of drains of an ether», before the field strength for a trial body will change, particles of an ether emitted by a trial body should react with contrary particles emitted by a central body. Then the particles of the central bodies, which have reacted on the path, should arrive to a trial body and change force of interaction (field strength). The mean time of interaction of all particles can be expressed so:

$$t_{\text{mt.i.}} = (2kR - l_1) / U, \text{ where:} \quad (21)$$

$2kR$ – double mean distance, which one pass all interacted particles up to their place of interaction;
k – factor indicating mean length of interaction;
l_1 – length of interaction (length, on which one happens motion of a body without increase of strength);
U – speed of interaction.

Time of arrival of signals from points A up to B in points after B is equal to time of motion of a trial body between these points. Assume that during interaction (t_{i1}) the body was transferred to point C. Obviously, length of interaction in a point $B(l_2)$ is less than length of interaction in a point $A(l_1)$ because the trial body became closer to a body of interaction M. It means, that the signals about change of strength from path AB will come in time t_{i1} up to a point C, and the signal from a point B, by virtue of $t_{i1} < t_{i2}$ will come not in point C, and earlier, for example, in point E.

Conclusion: «signals» of changes of strength from path from A up to B will come to a trial body on paths up to a point C and simultaneously, since a point E, will begin to come «signals» of change of strength after a point B. On a section of EC there will be a summation of changes of strength (retarded potential) from different segments of motion of a trial body.

We have taken process of interaction for particles on a cut R_i between bodies and quantity of particles changes according to the graph in a fig. 2. Having sum up processes of imposing of a retarded potential up on $R_i = 0...R$ we can reach the conclusion, that the harmonic constituent enters in process of change of strength at motion of a body in a field of forces. The strength of a gravitational field numerically is equal to acceleration of a trial body. Hence, inference can be made that taking into account principles of a short-range interaction, the trial body can not drop with acceleration, which one should have the law $\gamma M / R^2$ at indefinitely high speeds of interaction. Law of change of acceleration contains a harmonic constituent, i.e. *the trial body at falling in a field of forces should experience longitudinal vibrations of acceleration and speed*.

Energy of motion of a trial body at free fall taking into accont longitudinal vibrations

Logical, insufficiently precise from positions of a calculus the conclusion about non-uniformity of arrival signals of a retarded potential to a moving body, nevertheless, indirectly confirms by answering the problem on an energy conservation law at the retarded potential.

The law of the Weber was subjected a critic of Helmholtz on the part that it contradicts an energy conservation law. Maxwell supported a critic of Helmholtz.

Equation (8) and law of Gerber display, that the delay of a potential grows with increase of a relative velocity of bodies. The delay of a potential result in a conclusion about a violation of law of conservation of energy, if we'll be to consider it in existing frameworks of a classic mechanics, as that means, that the body loses potential energy more, than finds kinetic one. There are no basis from experience and observations of the nature for violation of the law of conservation of energy. Therefore conclusion that a body in energy of longitudinal vibrations will realize a «missing» part of energy is quite logical. The longitudinal vibrations are originated by «interference» of a coming lagging signal or its non-linearity forced by delta time of interaction, speed of a body and value of a potential.

In a mechanics of Newton the conservation law of energy at falling of a trial body can be recorded so:

$$E_{pot.} + E_{kin.} = \text{const, where:} \tag{22}$$

$$E_{pot.} = mv^2_{(U=\infty)} / 2, \text{ where:} \tag{23}$$

$v_{(U=\infty)}$ – speed of a body in the given point at indefinitely high speed of interaction.

At introduction to process of falling of definite velocity of interaction, the mean instantaneous velocity of a trial body in the given point will be less, for the reason that there is a delay of a potential and the body participates in longitudinal vibrations. Energy of a harmonic motion is determined by maximum instantaneous linear speed of a body

$$E_{osc.} = mv^2_{\max} / 2 \tag{24}$$

Both energy (14) and (15) at adiabatic process should be equal to a difference of potential energies:

$$E_{pot.} = \int_{\infty}^{R} F(R)dR \tag{25}$$

But

$$mv^2_{(U=\infty)} / 2 = mv^2_{\max} / 2, \text{ therefore:} \tag{26}$$

$$v_{(U=\infty)} = v_{\max} \tag{27}$$

The equality (27) is fair only for definite points of path defined by a particular oscillation phase, in this case the body reaches these points on time later, than in a mechanics of Newton. The speed of a body with longitudinal vibrations can be determined only as mean instantaneous speed and is phase one.

That part of energy of motion which one is determined by retarded potential will be converted to longitudinal vibrations only. But, as the delay of a potential depends on speed (see equations of Weber, Gerber etc. [24], [25]), and at $v \to 0$ the delay of a potential approaches to null too, a relation

$$v_{phase} = fv_{\text{lin.max}} \tag{28}$$

has the unknown law while, which one should be limited by two extremities: $v_{\text{phase}} \to v_{\text{lin.max}}$ at $v_{\text{phase}} \to 0$ (therefore, in this case $f \to 1$), and also $v_{\text{phase}} \to v_{\text{lin.max}} \to v_{\text{phase}}$ at $v_{\text{phase}} \to U$, moreover, the first extremity is abundantly obvious while last extremity assumes, that the body can reach speed of interaction. Thus there is a full delay of a potential, and the body gains the greatest possible energy, equal $E = m\alpha 2U^2 / 2$ or $E = \delta mU^2$, which one relativists, having entered concept of variable mass (according to a Lorentz factor), figure as $E = mc^2$, where c – speed of light.

Taking into account (19), energy of motion of bodies through a phase velocity will look like:

$$E_{mot.} = \frac{mV_{phase}^2 f^2}{2} \tag{29}$$

Length, frequency and energy of longitudinal vibrations

Reduced above scheme of a short-range interaction at free fall of a trial body in a field of a central force (fig. 3) allows to reveal relation of length of oscillations of a trial body to all variable factors. There are three variables: *a phase velocity, force of interaction and distance*.

Length of oscillations according to the scheme in a fig. 3 is proportional to length of interaction. Length of interaction for an arbitrary point R_i is equal:

$$l_i = t_i v_{phase\ i}, \text{ where:} \tag{30}$$

t_i – time of interaction;

$v_{phase\ i}$ – a mean phase velocity on l_i.

a) *Dependence of length of interaction on distance*

Time of interaction (t_i) and phase velocity ($v_{phase\ i}$) variously depend on distance. The time of interaction is directly proportional to distance from (30). The phase velocity is proportional to field strength $\gamma M / R_i^2$ and consequently is inversely proportional to a square of distance.

Therefore, the full proportionality of time of interaction to distance can be recorded:

$$l_1 \sim R \cdot \frac{1}{R^2} = \frac{1}{R} \tag{31}$$

a) *Dependence of length of interaction on force of interaction*

The relation l_i from $F(R)$ has more composite dependence, as in this case it is fulfilled, speaking a modern language, feedback. The length of interaction has influence on length of interaction by force of interaction.

This relation is responsible for the law of effect of a relative velocity of interacting bodies on force of interaction. And though the view of this law can be an occasion for debates (Weber`s, Gauss` or Gerber`s etc.), the feedback of length of interaction can be detected under the scheme of a fig. 3.

The more length of interaction, the greater distance is passed by a trial body without change of field strength (delay of a potential). It means the more loss of the unused force of interaction and the more loss of length of interaction:

$$l_i' \sim \frac{1}{\Delta F(R_i)} \sim \frac{1}{F(R_i)} \tag{32}$$

Besides, the force of interaction influences length of interaction by means of time of interaction. This relation is easier for expressing in the return order: the more force of interaction, the large phase velocity a body acquires on length of interaction. But the increase of speed proportionally reduces time of interaction, and length of interaction depends on time of interaction directly proportional:

$$F(R_i) \sim V_{phase} \sim \frac{1}{t_i} \sim \frac{1}{l_i''} \text{ or:} \tag{33}$$

$$l_i'' \sim \frac{1}{F(R_i)} \tag{34}$$

And, at last, as the phase velocity directly depends on force of interaction, it is possible to record:

$$l_i''' \sim V_{ph.i} \sim F(R_i) \tag{35}$$

Having united relation (21), (23) and (24), we shall obtain:

$$l_2 \sim l_i' l_i'' l_i''' \sim \frac{1}{F(R_i)} \tag{36}$$

b) *Dependence of length of interaction on a phase velocity*

At first, it is possible to reveal at once from (30), that

$$l_{i1} \sim V_{ph.\,i} \tag{37}$$

Secondly, the more time of interaction on length li, the less mean phase velocity on this section. And, therefore:

$$l_{i2} \sim t_i \sim \frac{1}{V_{ph.\,i}} \tag{38}$$

The more time of interaction, the higher phase velocity of a trial body at the expense of extension of operation of force. And then:

$$l_{i3} \sim t_i \sim V_{ph.\,i} \tag{39}$$

Thus, the proportionality of length of interaction of a phase velocity will be expressed by:

$$l_3 \sim l_{i1} l_{i2} l_{i3} \sim V_{ph.} \tag{40}$$

Having united (31), (36) and (40), we shall find, *that the full relation of length of interaction, which one is proportional to length of longitudinal vibration (fig. 3), from all three variables is equal*:

$$l \sim \lambda \sim l_1 l_2 l_3 = \frac{V_{phase}}{R \cdot F(R)}, \text{ or:} \tag{41}$$

$$\lambda = \frac{H V_{phase}}{R \cdot F(R)}, \text{ where} \tag{42}$$

H – proportionality factor.

The product $R \cdot F(R)$ in (42) is equal to a difference of potential energies at adiabatic free fall:

$$R \cdot F(R) = \Delta E_{pot.} = \int_{\infty}^{R} F(R)dR = E_{mot.} \tag{43}$$

Expressing length of oscillations through frequency:

$$\lambda = V_{phase} / \nu \tag{44}$$

and having substituted (43) and (44) in (42), we shall obtain:

$$E_{mot.} = H\nu \tag{45}$$

The obtained formula (45) for energy of motion of bodies with longitudinal vibrations is identical (except for internal concept of a constant *H*) to the formula of energy for radiation of Planck – Einstein. Such coincidence is not incidentally. It displays that radiation (photons) is secondary in relation to motion of a matter and confirms the perspicacious expression of Huygens that «light arises due to jerks, which particles of a matter inflict to particles of an ether».

De Broglie`s waves. Planck's constant

As (29) and (45) are expression of the same energy, namely, energy of motion of a body with longitudinal vibrations in field of forces, they can be equated:

$$\frac{mV_{phase}^2 f^2}{2} = H\nu \tag{46}$$

Or after transformation we shall obtain:

$$\lambda = \frac{2H}{mV_{phase}f^2}, \tag{47}$$

That represents modification of the law of de Broglie.

However formula (47) has principle differences with the law of de Broglie, both in a structure, and in interpretation of its connection with a natural phenomenon.

At first, the speed of a body in the law of de Broglie is not phase, though connection of this formula with a wavelength would give a hint.

Secondly, De Broglie enters the constant H as Planck's constant connected with a discretization of radiation of atoms. In this case, the constant H does not indicate a discretization of a wavelength, but it is the factor of proportionality dependent on a kind of interaction and on weight (more complicated manner). If interaction is electrical and mass of a body is equal to mass of an electron, H is a Planck's constant.

Thirdly, in the formula (47) there is a relation $f(V_{lin.\ max}, V_{phase})$ between linear maximum and phase velocity of a body. This relation can be detected with the help of modern mathematical methods and experiments and represents, most likely, factor of the retarded potential, which one in its lower and average values coincide with a factor of Lorentz.

Referance

1. Noskov N.K., To a Problem on the Restriction of Field of Application of a Classical Mechanics. SPE «Print», Institute of high-energy physics, Academy of Sciences; Kaz. SSR, Alma-Ata, 1991.
2. F. Harress. Die Geschwindigkeit des Lichtes in bewegten Körpern. Dissertation, Jena, 1912.
3. G. Sagnac. L'éther lumineux démontré par l'éffect du vent rélatif d'éther dans un interférométre en rotation uniforme. C. R., 1913, 157, p. 708...710.
4. A.A. Michelson. The effect of the Earth's rotation on the Velocity of light. I. Astrophys. J., 1925, 61, p. 137...139; A.A. Michelson, H. Gale. Idem II, Astrophys. J., 1925, 61, p. 140...145.
5. B. Pogany. Über die Wiederholung des Harres – Sagnaschen Versuches. Ann. Phys., 1926, 80, p. 217...231.
6. S.I. Vavilov. The experimental basis of a relativity theory. The collected works. v. 4, Akademisdat, M., 1956. In Russian.
7. I. Fiseau. About a hypothesis concerning a light ether and about one experiment, which, apparently, shows, that the movement of bodies changes velocity, with which light is propagated inside these bodies. C. R., 1851, 33, p. 349...355.
8. M. Hoek. Determination de la vitesse avec laquelle est entrainée une onde lumineuse traversant un milieu en mouvement. Arch. Neerl., 1868, 3, p. 180...185; 1869, 4, p. 443...450.

9. A.A. Michelson, E.W. Morley. Influence of motion of the medium on the velocity of light. Amer. J. Sci., 1886, 31, p. 377...386.

10. P. Zeeman. Experiences sur la propagation de la lumiére dans les milieux liquides ou solides en mouvement. Versl. Akad. Amster., 1914, 23, p. 245.

11. O. Fresnel. The letter to Arago «Concerning influence of movement of the Earth on some optical phenomena». 1818.

12. A.A. Michelson. Relative movement of the Earth and a lightcarriing ether. Amer. J. Phys., 1881, 22, p. 120...129.

13. A.A. Michelson and E.V Morley. About relative movement of the Earth in an lightcarriing ether. Amer. J. Sci., 1887, 34, p. 333...345.

14. A.A. Michelson, D.C. Miller. The report on experiment on detection of effect Fitzgerald – Lorentz. The philosophical logbook, 8 (6), 680...685, 1905.

15. D.C. Miller. An ethereal wind. The report read in the Washington Academy of sciences. Science, 1926, v. LXII, No. 1635.

16. D. Bradley. The letter to Galleo. 1728.

17. O. Römer. The proof concerning velocity of light. 1675.

18. Riemann. In: N.T. Rousver. A perihelion of a Mercury from Leverje up to an Einstein. World, M., 1985, page 130. In Russian.

19. K. Pearson. Ether squirts. Am. J. Math., 13, p. 309...362, 1891.

20. G.A. Schott. On the electron theory of matter and the explanation of fine spectrum lines and of gravitation. Phil. Mag. (Ser. 6), p. 21...29, 1906.

21. B. Thomson. On the ultramundane corpuscles of LeSage. Phil. Mag. (Ser. 4), 45, 1873, p. 321... 332.

22. K.A. Bjerknes. The pulsation theory of gravitation. 1856. In: N.T. Rousver. A perihelion of a Mercury from Leverje up to an Einstein. Mir, M., 1985, page 125. In Russian.

23. C.F. Gauss. Transactions, v. 5, Royal science foundation, Goettingen, 1867.

24. W. Weber. Werke, Vol. 4, 247... 299, Springer, Berlin, 1894.

25. Gerber P. Die räumliche und zeitliche Ausbreitung der Gravitation. Z. Math. Phys., v. 43, p. 93...104, 1898.

Date of publication:

June 19, 2002

Electronic version: