Gravitation in the theory of compressible oscillating ether

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Abstract. Previously, the basic laws and equations of electrodynamics, atomic physics, and elementary particles theory were derived from the theory and equations of compressible oscillating ether. In this work, the ethereal theory of gravitation is constructed, the similarities and differences between gravitational and electrostatic fields are explained. It is shown that in gravitation there are no attractive forces, but there are pressing forces, and that the gravitational constant is not really constant, but weakly depends on the chemical composition of interacting bodies. Gravitational interactions between bodies do not propagate from one body to another at a certain speed, and at any moment, the stationary gravitational fields exist with and around the bodies, and therefore neither gravitational waves nor gravitons exist in nature. The values of all parameters of the ether, including the density of its unperturbed state, are found

1. Introduction
Gravitation is one of the most mysterious physical phenomena that cannot be explained by modern physics. In Newtonian theory, gravitation is identified with the gravitational interaction of material bodies, which is described by a very simple law of universal gravitation:

\[ F = G \frac{m_1 m_2}{r^2}. \] (1.1)

The proportionality coefficient \( G \) is called the gravitational constant. It characterizes the intensity of gravitational interaction and is one of the main physical constants. In the formula (1.1) we are talking about two forces of equal magnitude, connecting two bodies and directed towards each other in a straight line, with which, according to Newton’s third law, the bodies act on each other. However, Newtonian mechanics prefers not to answer the question about the mechanism of transfer of gravitational interaction from one body to another, based on the concept of long-range action, according to which one body acts on another directly and instantly, without any involvement of an intermediate medium.

In modern physics, it is preferred to use the concept of short-range interaction, in which the transfer of interaction between bodies is carried out through a special kind of material medium - a gravitational field, the strength characteristic of which is its intensity. It is believed that any body of mass \( m \) creates around itself a gravitational field with the intensity \( E = Gm/r^2 \) which has the dimension of acceleration \( ms^{-2} \) in the SI system. But then, as follows from the experimental data, the speed of propagation of the gravitational interaction should be several orders of magnitude higher than the speed of light, which has no reasonable explanation. An attempt to solve this paradox is Einstein's
general theory of relativity, according to which gravitation is not considered as the distribution of force interaction in space, but is supposedly the result of the fact that the masses can somehow miraculously distort the four-dimensional spatio-temporal continuum in their vicinities. This hypothesis is just a geometric abstraction, contrary to common sense, and in no way can be considered as an explanation of gravitation. For all experimental observation data, which supposedly confirm the theory of relativity, there are alternative, and much more reasonable, explanations. In addition, the presence of the second degree of the distance between the bodies in the formula (1.1) clearly indicates that the space around us is a three-dimensional plane Euclidean space and that gravitation is somehow closely related to electric charges. Indeed, the Coulomb law of the interaction of two electric charges in the CGS system has a similar form

$$F = \frac{q_1 q_2}{r^2},$$

and the intensity of the electrostatic field created by the charge $q$ is equal to $E = q/r^2$ and has a dimension $g^{1/2} cm^{-1/2} s^{-1}$ in the CGS system. The similarity of the electrostatic and gravitational fields is also indicated by the fact from the theory of the compressible oscillating ether developed by the author [1-6] that in the case when the ether density has a dimension $[\rho] = g^{1/2} cm^{-3/2} s$, the dimensions of all physical quantities in the ether theory coincide with the dimensions of these quantities in CGS system. In the case of the dimensionless ether density, all physical quantities have the same dimensions in SI and CGS systems, expressed exclusively through the dimensions of space and time, and, in particular, the charge and mass have the same dimension $[q] = [m] = cm^3 s^{-2}$.

However, along with similarity, gravitational and electrostatic fields have significant differences. Firstly, gravitational forces act between any bodies, and electric forces act only between charged ones. Secondly, gravitational forces are incomparably smaller than electric ones and are manifested mainly in the presence of astronomical objects with a huge mass. Thirdly, in gravitation there are only attractive forces, while in electricity there are also repulsive forces. Fourth, the accuracy of experimental measurements of the value of the gravitational constant $G$ is several orders of magnitude lower than the accuracy of measurements of other physical quantities, and the accuracy intervals of various measurements do not overlap. It creates a lasting impression that the gravitational constant is not constant. For 2018 year, it is generally accepted that $G = 6.67430 \cdot 10^{-11} g^{-1} cm^3 s^{-2}$ [7]. Other measurements of the gravitational constant are shown in Fig. 1, taken from [8].
The aim of this work is to derive from the system of equations of compressible oscillating ether the equations for the intensities and forces of electrostatic and gravitational fields that intelligently explain all the similarities and differences between them and satisfy the Coulomb law and universal gravitation law. The ether equations themselves

\[
\frac{\partial \rho}{\partial t} + \nabla \cdot (\rho \mathbf{u}) = 0, \quad \frac{d\rho \mathbf{u}}{dt} = \frac{\partial \rho \mathbf{u}}{\partial t} + (\mathbf{u} \cdot \nabla)(\rho \mathbf{u}) = 0, \quad (1.3)
\]

and numerous consequences of them in the form of various physical laws and equations were obtained by the author in [1-6]. In (1.3) perturbations of ether density \( \rho(t, \mathbf{r}) \) move with coordinates \( \mathbf{r}(t) \) and velocity vector \( \mathbf{u}(t, \mathbf{r}) \). Ether mass and density are not the mass and density of a matter and they have another dimension.

2. Charges and fields of elementary particles

Electron and proton are the basic elementary particles of which matter is composed. They have opposite in sign and absolute in value electric charges and electrostatic fields. And since the intensities of electrostatic and gravitational fields have a similar form (see above), these fields must be sought among the solutions of the system of equations (see [1-3])

\[
\frac{\partial \rho}{\partial t} + \frac{\partial (\rho V)}{\partial r} + \frac{2(\rho V)}{r} + \frac{1}{r \sin \theta} \frac{\partial (\rho W)}{\partial \varphi} = 0, \\
\frac{\partial (\rho V)}{\partial t} + V \frac{\partial (\rho V)}{\partial r} + \frac{W \partial (\rho V)}{r \sin \theta} = 0, \quad (1_r) \\
\frac{\partial (\rho W)}{\partial t} + V \frac{\partial (\rho W)}{\partial r} + \frac{W \partial (\rho W)}{r \sin \theta} = 0, \quad (1_\varphi)
\]

the solutions of which are the wave structures of proton and electron. In (2.1)

\[
\mathbf{u} = u_r \mathbf{i}_r + u_\varphi \mathbf{i}_\varphi = V \mathbf{i}_r + W \mathbf{i}_\varphi; \quad V = \frac{dr}{dt}, \quad W = r \sin \theta \frac{d\varphi}{dt},
\]

where \( (\mathbf{i}_r, \mathbf{i}_\theta, \mathbf{i}_\varphi) \) are the unit coordinate vectors of the stationary spherical coordinate system [1].

2.1. Charges and masses of electron and proton

As it shown in [1-2], electron and proton are spherical wave solutions of the system of equations (2.1) generated by half-waves of rolled up photons with \( W = \omega r \sin \theta \),

\[
V(t, r, \theta, \varphi) = \frac{V(\theta) \cos((\omega t - \varphi)/2)}{r}, \quad \frac{d\varphi}{dt} = \omega, \quad \rho(t, r, \theta, \varphi) = \rho_0 \left(1 - \frac{V(\theta) \varphi \cos((\omega t - \varphi)/2)}{\omega r^2}\right)
\]

under the assumption that the velocity \( V(t, r, \theta, \varphi) \) of radial oscillations of the ether density is small. A proton is a half-wave of periodic compression of the particle volume with a periodic small decrease in the particle radius, and average ether density inside the proton is higher than the density of its unperturbed state \( \rho_0 \). An electron is a half-wave of periodic expansion of the particle volume with a periodic small increase in the particle radius, and average ether density inside the electron is lower than the density of its unperturbed state \( \rho_0 \). The electron and proton have constant angular propagation velocity \( \omega_{e,p} = c / r_{e,p} \) of ether density perturbations inside their balls, where \( c \) is the speed of light,
and the radii $r_{e,p}$ of the balls of electron and proton are the Compton radii, such that the circumference of the circles $2\pi r_{e,p}$ coincides with the Compton wavelengths $2\pi\hbar/(m_{e,p}c)$ for these particles, where $m_{e,p}$ are the masses of electron and proton, $\hbar$ is the Planck’s constant, and

$$m_{e,p} = \frac{\hbar \omega_{e,p}}{c^2} = \frac{\hbar}{c r_{e,p}}, \quad \hbar = \frac{\pi^2 \rho_0^2 c V_0^2 d}{4}, \quad d = 4.8384949.$$ 

For charges of electron and proton the next expression takes place

$$q_{e,p} = \pm \frac{\pi}{2} \int_0^{2\pi} \int_0^{r_0} \frac{\rho_0 \omega_{e,p} V_{e,p}(\theta)}{8\pi r^4} \sin \left(\frac{\xi}{2}\right) r^2 \sin \theta \sin \frac{\xi}{2} d \xi d \theta = \pm \rho_0 c V_q = \mp q,$$

$$V_{p,e}(\theta) = V_0 \left(a + \sin \theta + b_{p,e} \sin 2\theta + c_{p,e} \sin 3\theta\right), \quad V_q = \int_0^\pi V_{e,p}(\theta) \sin \theta d \theta = V_0 \left(2a + \frac{\pi}{2}\right).$$

### 2.2. Electrostatic fields of electron, proton and neutron.

It is natural to introduce the electric field intensity by analogy with the electric field intensity when deriving the generalized nonlinear system of Maxwell equations from the ether equations [1-2], that is

$$E_{e,p} = \pm \frac{W}{r \sin \theta} \frac{\partial (\rho V_{e,p})}{\partial \varphi} \mathbf{i}_r \approx \pm \frac{\omega_{e,p} \rho_0}{2r} V_{e,p}(\theta) \sin \left(\frac{\xi}{2}\right) \mathbf{i}_r, \quad 0 \leq \xi = \left(\omega_{e,p} t - \varphi\right) < 2\pi,$$

that is, the electrostatic field of the electron is directed from its center, and the electrostatic field of the proton is directed to its center. The vector $E$ is directed along the radius and has a dimension $g^{1/2} cm^{-1/2}s^{-1}$ in the CGS system or an acceleration dimension $cm/s^2$ in the case of dimensionless of the ether density. We will find now the electrostatic fields created by the proton and electron outside their balls. Obviously, it should be $W = c \sin \theta$, when $r > r_{e,p}$, since the speed of light $c$ is the speed of propagation of perturbations in the ether medium. Then the system of equations (2.1) goes over to the system

$$\frac{\partial \rho}{\partial t} + \frac{\partial (\rho V)}{\partial r} + \frac{2(\rho V)}{r} + \frac{c \partial \rho}{r \partial \varphi} = 0,$$

$$\frac{\partial (\rho V)}{\partial t} + V \frac{\partial (\rho V)}{\partial r} + \frac{c \partial (\rho V)}{r \partial \varphi} = 0, \quad (1_r)$$

$$\frac{\partial \rho}{\partial t} + V \frac{\partial \rho}{\partial r} + \frac{c \partial \rho}{r \partial \varphi} = 0, \quad (1_\varphi).$$

A solution to the system of equations (2.3) will be sought under the following conditions

$$|V(t, r, \theta, \varphi)| \ll 1, \quad \rho = \rho_0 \left(1 + g(t, r, \theta, \varphi)\right), \quad |g(t, r, \theta, \varphi)| \ll 1.$$
\[ \frac{\partial g}{\partial t} + \frac{\partial V}{\partial r} + \frac{2V}{r} + \frac{c \partial g}{r \partial \varphi} = 0, \]

\[ \frac{\partial V}{\partial t} + \frac{c \partial V}{r \partial \varphi} = 0, \quad (1_r) \]

\[ \frac{\partial g}{\partial t} + \frac{c \partial g}{r \partial \varphi} = 0. \quad (1_\varphi) \]

From the last system of equations we find that

\[ V = \frac{f(\theta)}{r^2}, \quad g = \psi(r, \theta) \cos((\omega t - r \varphi / r_0) / 2). \]

It is natural to assume that electric fields and small perturbations of the ether density of elementary particles outside their balls should coincide at the boundaries of the balls with electric fields and small perturbations of the ether density found inside the balls and given by formulas (2.2). We will find solutions of system (2.4) satisfying these conditions in the form

\[ V = \frac{dr}{dt} = \frac{cr_0^2}{r^2}, \quad \rho = \rho_0(1 + \frac{V(\theta)}{cr_0} \cos(\omega t - r \varphi / r_0) / 2), \quad \frac{d\varphi}{dt} = \frac{c}{r} \]

Then the densities of the electric fields strengths outside of the rolled up photon of the double period and elementary particles are equal

\[ E_0 = \frac{c}{r} \frac{\partial (\rho V)}{\partial \varphi} l_r, \quad E_{e,p} \approx \pm \frac{c \rho_0}{2r^2} V_{e,p}(\theta) \sin(\xi / 2) l_r, \quad \xi = (\omega_{e,p} t - r \varphi / r_{e,p}). \quad (2.6) \]

Expressions (2.6) and (2.2) coincide for \( r = r_{e,p} \), that is, the electric fields inside and outside the balls of elementary particles coincide at the boundaries of these balls and, therefore, the electric field of the elementary particle is continuous at its boundary. The radial propagation velocities of electrostatic disturbances at the boundaries of the electron and proton balls are equal to the speed of light and decrease in proportion to the square of the distance from the centers of the balls. Averaging the obtained expressions (2.6) for each \( r > r_{e,p} \) along the surface of a sphere of radius \( r \) in the space with coordinates \( (r, \theta, \xi) \), \( 0 \leq \xi = (\omega_{e,p} t - r \varphi / r_{e,p}) < 2\pi \), we obtain expressions for the electrostatic fields of an electron and proton, depending only on the distances to the particle centers:

\[ E_{e,p} = \pm \frac{c \rho_0}{4\pi r^2} \int_0^{2\pi} \int_0^{\frac{\pi}{2}} V_{e,p}(\theta) \sin(\xi / 2) r^2 \sin \theta d\xi d\theta l_r = \pm \frac{c \rho_0 V_q}{2\pi r^2} l_r = \pm \frac{q}{r^3} l_r. \quad (2.7) \]

Consequently, the electrostatic field of an electron is directed from its center, and the electrostatic field of a proton is directed to its center. The expressions obtained are a generalization of Coulomb's law. It follows from them that electrons repel with a force determined by Coulomb's law, and electrons and protons are attracted with the same force (that is, the electrostatic field of a heavy proton presses a light electron to a proton, but the electrostatic field of a light electron cannot repel a heavy proton from itself). But it does not follow from the obtained results that the protons must be repelled from each
other according to the Coulomb law. That is, there is another explanation for the phenomenon, called the Coulomb barrier in modern nuclear physics [1-3]. A neutron consists of the superposition of unidirectional waves of a compressed proton and a compressed electron [1], for the electrostatic fields of which the formulas (2.7) are valid. Therefore, the electrostatic field of the neutron is zero as the sum of oppositely directed and equal in magnitude electrostatic fields of the proton and electron.

2.3. Gravitational fields of electron, proton and neutron

Let us show that system (2.4) has other solutions that can be interpreted as gravitational fields of an electron, proton, and neutron. It is clear that electrostatic and gravitational fields outside the electron and proton balls must be described by the same small perturbations of the ether density, and the radial propagation velocities of these perturbations can vary. It is natural to assume that the radial propagation velocities of gravitational perturbations at the boundaries of the electron and proton balls should be equal in amplitude to the boundary values of the radial propagation velocities of the ether density perturbations inside the balls, which are described above in sec. 2.1. In accordance with this assumption, we will seek solutions to the system of equations (2.4) that describe the gravitational fields of the electron, proton, and neutron, in the form

\[ V = \frac{dr}{dt} = \frac{V_0 r_{e,p}}{r^2}, \rho = \rho_0 \left( 1 + \frac{V_{e,p}(\theta)}{c r_{e,p}} \cos \left( \frac{\omega_{e,p} t - r \varphi / r_{e,p}}{2} \right) \right), \frac{d\varphi}{dt} = \frac{c}{r}. \]  

Consequently, the densities of gravitational fields strengths outside the rolled up photon, electron and proton are equal

\[ G_0 = \frac{c}{r} \left( \frac{\partial (\rho V)}{\partial \varphi} - i_r \right), \quad G_{e,p} = \pm \frac{\rho_0 V_0}{2 r^2 r_{e,p}} V_{e,p}(\theta) \sin \left( \frac{\omega_{e,p} t - r \varphi / r_{e,p}}{2} \right) \frac{d\varphi}{dt}. \]

Averaging the obtained expressions (2.9) for each \( r > r_{e,p} \) over the surface of a sphere of radius \( r \) in a space with coordinates \( (r, \theta, \xi) \), \( 0 \leq \xi = (\omega_{e,p} t - r \varphi / r_{e,p}) < 2\pi \) we obtain expressions for the gravitational fields of the rolled up photon, electron and proton, depending only on the distances to the particle centers: \( G_0(r) = 0 \),

\[ G_{e,p}(r) = \pm \frac{\rho_0 V_0}{4 \pi r^2 r_{e,p}} \int_0^{2\pi} V_{e,p}(\theta) \sin \left( \frac{\xi}{2} \right) r^2 \sin \theta d\xi d\theta i_r = \pm \frac{\rho_0 V_0 i_q}{2 \pi r_{e,p} r^2} i_r = \pm \frac{V_0}{c r_{e,p}} \frac{q}{r^2} i_r. \]

Consequently, the gravitational field of proton is directed toward its center, inversely proportional to the radius of proton and inversely proportional to the square of the distance from its center. The gravitational field of electron is directed from its center, inversely proportional to the radius of electron and inversely proportional to the square of the distance from its center. Thus, the gravitational field of a charge is less than its electrostatic field in \( c r_{e,p} / V_0 \) times, and the gravitational field of an electron is approximately 1836 times less than the gravitational field of a proton.

We find now the gravitational field of neutron. A neutron consists of a compressed proton and a compressed electron with the same functions \( V_n(\theta) \), and the radius of compressed proton \( \tilde{r}_p \) is four times smaller than the radius of neutron \( r_n \), equal to the radius of the compressed electron \( \tilde{r}_e = r_n = 33/31 r_p \) [1-2]. The neutron charge and its electrostatic field are zero, but its gravitational field should be approximately equal to the gravitational field of proton and directed toward the center of neutron, which the universality of the law of gravitation requires. Otherwise, the gravitational constant \( G \) would be significantly different for the masses of bodies of chemical elements consisting of atoms with a significantly different number of neutrons in the nuclei. We put in (2.8)
\[
V(\theta) = V_\alpha(\theta), \quad V = \frac{kV_0 r_{e,p}}{r^2}, \quad \omega = \omega_n.
\]

Then the gravitational fields for a compressed electron and proton have the form

\[
G_{e,p}(r) = \pm \frac{k_0 V_0}{4\pi r^2 r_{e,p}} \int_0^{2\pi} \int_0^\pi V_\alpha(\theta) \sin \left(\frac{\xi}{2}\right) r^2 \sin \theta d\xi d\theta l_r = \pm \frac{k_0 V_0}{2\pi r_{e,p} r^2} l_r = \pm \frac{k_0 V_0 q}{cr_{e,p} r^2} l_r. \quad (2.11)
\]

It follows from (2.10) that the gravitational field of a compressed proton is 124/33 times greater than the gravitational field of a proton, and the gravitational field of a compressed electron is 31/33 times less than the gravitational field of a proton. Consequently, the gravitational field of a neutron as the difference between the gravitational fields of compressed proton and electron is 93/33 = 31/11 of the gravitational field of a proton. That is, for k = 11/31 in (2.11), the neutron gravitational field is equal to the proton gravitational field and is directed toward the center of the neutron, that is:

\[
G_n(r) = -\left(\frac{k_0 V_0}{4\pi r_{e,p}} - \frac{k_0 V_0}{4\pi r^2 r_{e,p}}\right) \int_0^{2\pi} \int_0^\pi V_\alpha(\theta) \sin \left(\frac{\xi}{2}\right) r^2 \sin \theta d\xi d\theta l_r = -\frac{V_0}{cr_{e,p} r^2} l_r = G_p(r). \quad (2.12)
\]

3. Gravitational fields of masses. The law of universal gravitation

We express the gravitational field of a unit charge of a proton through its mass. Since \(m_p = \hbar/cr_p\) and \(q^2 = \alpha \hbar c\), where \(\alpha\) is the fine structure constant, then

\[
q = \left(\sqrt{\alpha c / \hbar}\right)m_p cr_p.
\]

Then the force \(F_{p,p}(r)\) of the gravitational interaction of two unit charges (protons), expressed through their masses, can be written in the form

\[
|F_{p,p}(r)| = |G_p(r)q| = G_{p}(r)q = \frac{V_0 q^2}{cr_p^2} = \frac{V_0 \alpha c^2 m_p^2}{cr_p^2} = \left(\frac{V_0 ac^2}{\hbar c} r_p^2\right) \frac{m_p m_p}{r^2} = G \frac{m_p m_p}{r^2}, \quad (2.13)
\]

where \(G = V_0 ac^2 / \hbar c\) is the gravitational constant having the dimension \([G] = g^{-1} cm^3 s^{-2}\). It remains to generalize the formula (2.13) to arbitrary material bodies with masses \(m_1\) and \(m_2\) and to compare the resulting expression with the law of universal gravitation (1.1). Since the gravitational field of a neutron is equal to the gravitational field of a proton and is directed to the center of the neutron, the gravitational fields of proton and neutron expressed through their masses can be written as

\[
|G_p(r)| = G_{p}(r) = \frac{m_p}{r^2}, \quad |G_n(r)| = G_{n}(r) = \frac{m_n}{r^2}. \quad (2.14)
\]

The mass of any material body is equal to the sum of the masses of atoms of the chemical elements that make up this body, and the mass of each atom is equal to the sum of the masses of protons and neutrons of the atomic nucleus and the masses of electrons of the electron shell of the atom. The presence of electrons, the number of which is equal to the number of protons of the nucleus, reduces the gravitational interaction of protons by \(1/1836 = 0.0005446\). Two extreme cases are two bodies of mass \(m\), one of which consists only of neutrons, and the other does not have neutrons at all (hydrogen). Consequently, the gravitational field created by an arbitrary mass \(m\) has the form
\[ G(r) = \frac{G m}{r^2}, \quad G_{\text{min}} = 0.9994554 \left( \frac{V_0 a c^2 r_p}{\hbar} \right) \leq G \leq G_{\text{max}} = \frac{V_0 a c^2 r_p}{\hbar}. \quad (2.15) \]

So, the gravitational constant in (1.1) is actually not a constant, but can take any values from the interval (2.15) depending on the chemical composition of the bodies under consideration. The forces of gravitational interaction (pressing, but not attraction) of two bodies in the formula (1.1) can also slightly differ from each other. Let us compare formula (2.15) with the experimentally measured values of the gravitational constant shown in Fig.1. If we put \( G_{\text{max}} = 6.6757 \cdot 10^{-8} g^{-1} cm^3 s^{-2} \), then \( G_{\text{min}} = 6.67206 \cdot 10^{-8} g^{-1} cm^3 s^{-2} \), and the entire interval of various experimental values of the gravitational constant presented in Fig.1 completely fits into the interval specified by the formula (2.15). Consequently, different values of the gravitational constant are determined not by the poor accuracy of the experiments, but by the different chemical composition of the material bodies participating in the experiments, that is a different number of electrons that reduce the magnitude of the gravitational field.

Let us calculate, for example, the value of the gravitational constant for the earth's crust, 99.48% of which consists of nine elements according to A.P. Vinogradov [9]: O - 47%, Si - 29.5%, Al - 8.05%, Fe - 4.65%, Ca - 2.96%, Na - 2.5%, K - 2.5%, Mg - 1.87%, Ti - 0.45%. We assume that in the nuclei of atoms of elements that make up the remaining 0.52% of the mass of the earth's crust, the ratio of the number of neutrons to the number of protons is approximately 1.25. After calculations taking into account various stable isotopes of each element, we find that the gravitational constant for the earth's crust is approximately equal to \( G = 6.6739 \cdot 10^{-8} g^{-1} cm^3 s^{-2} \). As a second example, we calculate the gravitational constant for our Universe, in which the atoms of hydrogen (77.4%) and the atoms of the remaining 0.2% of atoms in the Universe, the number of protons is also approximately equal to the number of neutrons. Then for the Universe \( G = 6.6725 \cdot 10^{-8} g^{-1} cm^3 s^{-2} \).

The results obtained give finally the opportunity to determine the main parameters of the ether \( \rho_0 \) and \( V_0 \) from the system of equations

\[ h = \frac{\pi^2 \rho_0^2 \nu_0^2 c d}{4} = 1.0546 \cdot 10^{-27} g \cdot cm^2 s^{-1}, \quad G = \frac{V_0 a c^2 r_p}{\hbar} = 6.6757 \cdot 10^{-8} g^{-1} cm^3 s^{-2}. \quad (2.16) \]

From the first equation we find that \( \rho_0 V_0 = 5.42826 \cdot 10^{-20} g^{1/2} cm^{1/2} \). Since \( \alpha = 0.0072974 \), then from the second equation we find that \( V_0 = 5.10438 \cdot 10^{-40} cm^2 s^{-1} \). Then for the density of the unperturbed ether we get that \( \rho_0 = 1.06345 \cdot 10^{20} g^{1/2} cm^{-3/2} s \). Now let us make sure that the condition \( V_0 / r_p < 1 \) used in the theory of compressible oscillating ether and in this work is indeed fulfilled. Since \( r_p = 2.103 \cdot 10^{-14} cm \) then \( V_0 / r_p = 2.427 \cdot 10^{-26} cm \cdot s^{-1} \ll 1 \).

Let us return to the similarities and differences between gravitational and electrostatic fields noted in the introduction. Both fields are created by charges of electrons and protons and are the result of small periodic changes in the density of the ether in the space surrounding them with stationary distributions of radial velocities and intensities of these changes. Electrostatic forces act only between charged bodies, since in uncharged bodies having an equal number of protons and electrons the intensities of their electrostatic fields mutually cancel each other. Gravitational forces act between any bodies and are directed towards bodies that create gravitational fields, which is explained by the presence of gravitational fields of protons and neutrons directed to the particle centers and negligibly small gravitational fields of electrons directed away from the centers of the particles. Gravitational fields are less than electrostatic fields at \( cr_p / V_0 = 1.235 \cdot 10^{36} \) times. In gravity there are no attractive forces, but there are pressing and repulsive forces, but the electron repulsive forces are negligibly small compared to the pressing forces of protons and neutrons. Gravitational interactions between
bodies do not propagate from one body to another at a certain speed, but at any moment in time, the stationary gravitational fields of any bodies exist with them and around them. Neither gravitational waves nor gravitons exist in nature. The gravitational constant is really not constant, but weakly depends on the chemical composition of the interacting bodies. With increasing body mass, the pressure inside the body increases, which should lead to an increase in stresses during compression of the ether that generated this body. The latter, ultimately, should lead to gravitational collapse with the release of a huge amount of compressed ether energy.

4. Conclusion
In this paper, the ethereal theory of gravitation is constructed, the similarities and differences between gravitational and electrostatic fields are explained. It is shown that in gravity there are no attractive forces, but there are pressing or pushing forces, and that the gravitational constant is actually not a constant, but weakly depends on the chemical composition of interacting bodies. Gravitational interactions between bodies do not propagate from one body to another, and at any time, stationary gravitational fields of any bodies exist with and around the bodies, and therefore neither gravitational waves nor gravitons exist in nature. The values of all parameters of the ether, including the density of its unperturbed state, are found.

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