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Envelopes of Moving Electric Fields Create Gravitational Field

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ABSTRACT

Every matter has a gravitational field. The gravitational field of the matter is a consolidation of the gravitational fields of all molecules or atoms of the matter. The envelope surfaces of electric fields of moving electrons in an atom or a molecule form the gravitational field of the atom or the molecule. This origin of the gravitational field is found in this article. A simplified macro model for an atom is also proposed for this purpose. As an application of the theory, a formula for finding velocity of electrons in an atom is derived.

***Keywords*:** Laws of attraction, Relative mass, Atomic models, Mathematical envelopes.

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1. INTRODUCTION

An electron with negative charge has a negative electric field. A positron or a proton with positive charge has a positive electric field. Let us use the word positron to refer to a proton in this article. Any positive electric field and any negative electric field attract each other. When a current flows through a metallic wire, the moving electric fields of the moving outer orbit electrons of atoms of the wire creates magnetic field. If a moving outer electron's electric fields are considered in the form of spherical surfaces of balls with moving centre at the moving electron's positions and with a fixed radius, then the mathematical envelope surface (T.J. Willmore, An Introduction to Differential Geometry) of these spherical surfaces becomes a part of a magnetic field. All these origins are known to us from experiments. Existence of gravitational fields is also known from experiments [20]. Origins for existence of gravitational fields are proposed in many research works, but there is no exact experimental evidence [1, 5, 8, 10, 13, 16, 18, 19, 23, 24, 25]. The present article also proposes a reason for existence of gravitational fields. Gravitational field of an object depends on the gravitational fields of the atoms or the molecules of the object. So, the problem of finding a reason for existence of gravitational field of a general object can be reduced to finding a reason for existence of gravitational field of an atom. The present article finds a reason only for an atom, based on a postulate or an assumption. Theory of special relativity (R. Resnick, Introduction to Special Relativity) depends on the Lorentz transformation based on the postulate: "Speed of any moving matter or energy cannot exceed the speed of light in vacuum". Results from one article cannot be compared with the results of another article, or, results from one article cannot be used in another article, unless the assumptions of these articles are consistent. Before using results of an article, the assumptions made directly or indirectly in that article should be understood. Let us record the assumption made in this article explicitly as much as possible.

2. POSTULATES OR ASSUMPTIONS

Electrons, protons, and neutrons do not have gravitational field. If a sphere S having centre at the nucleus part of an atom is considered, then orthogonal projections of all directed paths of all electrons cover almost all directed circular paths on the sphere. These are the assumptions made in the present article. These assumptions help us to design a simplified macro model for an atom just for establishing existence of gravitational field of an atom.

3. GRAVITATIONAL FIELD OF AN ATOM

Let us consider an atom and a sphere S with centre at the nucleus part of an atom such that the atom is inside the sphere. Let us consider the moving electric fields of moving electrons of the atom. Because of the assumption made, spherical surfaces of the moving electric field balls of electrons form envelopes which become a part of a field. This field attracts another such a field of another atom because the electric fields of electrons are attracted by the fields of protons at the nucleus parts. These fields constructed by the envelopes [3] are the gravitational fields of the atoms. This is further explained by a simplified macro model of an atom in the next section [14].

4. SIMPLIFIED MACRO MODEL FOR AN ATOM

Let us first take a spherical object with many nails fixed on the outer surface. An insulated copper wire is wound around on the surface of the sphere in circular form with another property to be mentioned below. The two ends of the wire are connected with the two nodes of a high voltage low current DC (direct current) supply source. The wire should be wound on the surface of the spherical object such that the current can pass through the wire in all circular directions of all possible circular parts of the wire, as shown in Figure 1. This winding could be done with the help of nails. Moreover, this winding should not have sharp turns. While the direct current flows through the wire, electrons move in all directions of all possible circular parts of the wire. This constructed part can be considered as a simplified portion containing all moving electrons of an atom. Let us call this constructed part as "moving electrons sphere."

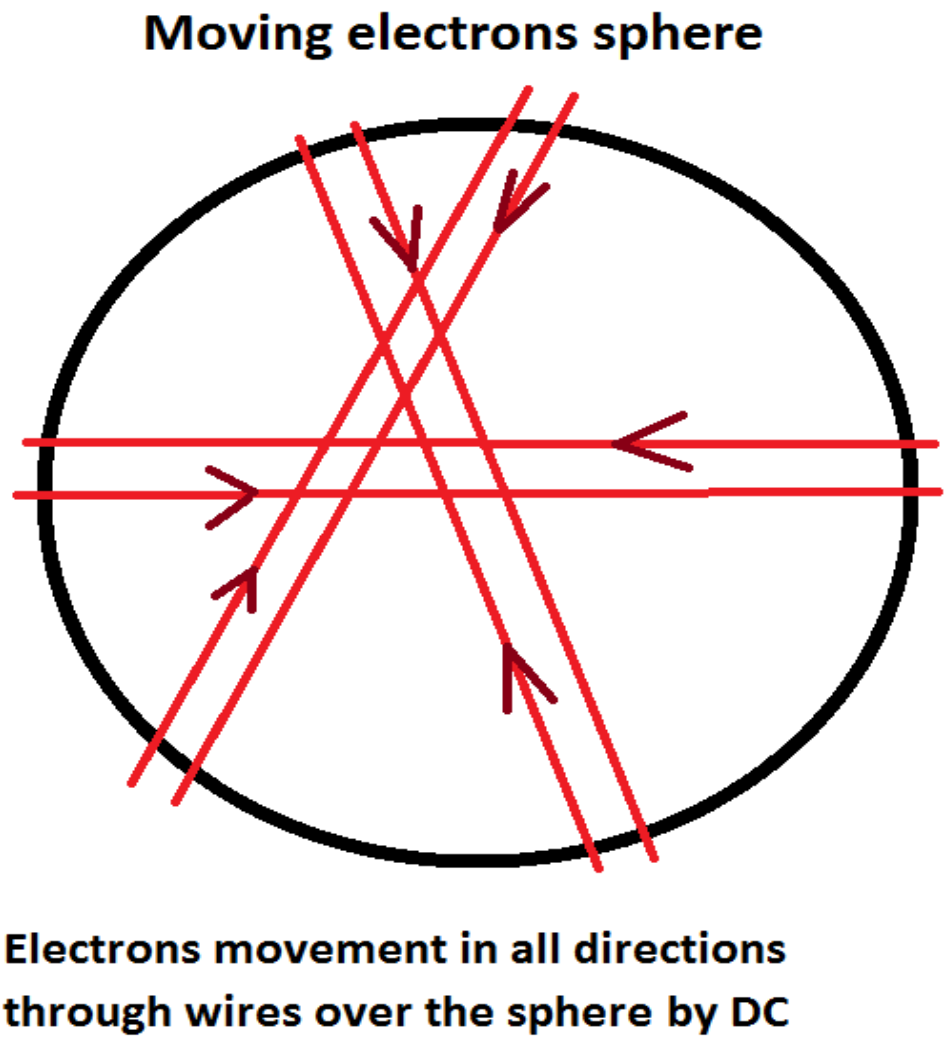

Figure 1. Model for a portion containing all moving electrons.

In the second part, let us consider a copper sphere connected by a copper wire with the positively charged portion of a Van de Graaff generator [9, 17, 22] as shown in Figure 2. This positively charged copper sphere may be considered as a simplified portion containing all positrons of an atom. Let us call this positively charged sphere as "positron sphere."

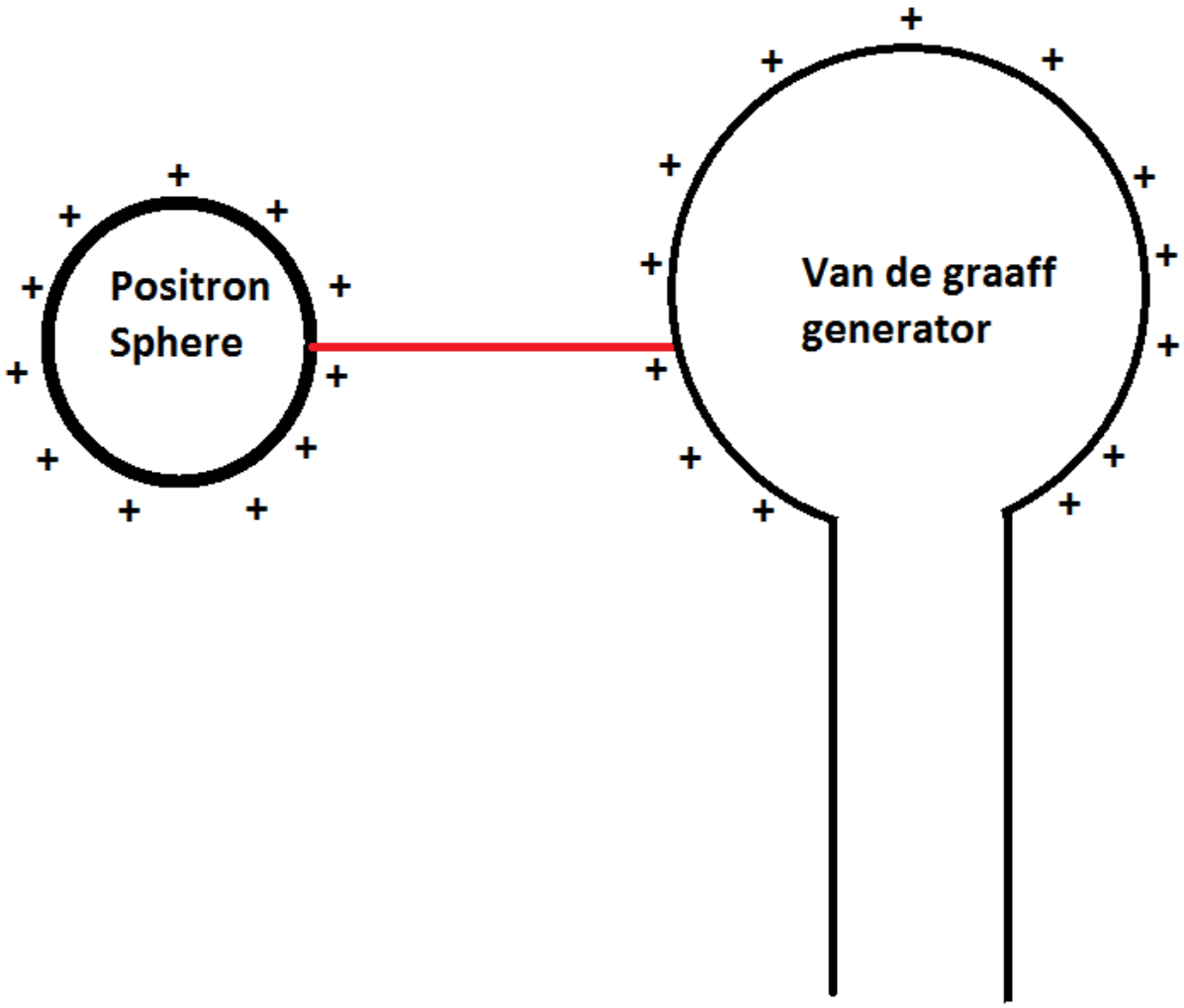

Figure 2. Model for a portion containing all protons.

In the third part, let us fix positron sphere inside the moving electrons sphere such that the positron sphere is connected with the Van de Graaff generator, and the ends of the copper wire wound over the moving electrons sphere are connected with the nodes of the DC supply source. This is a simplified macro model for an atom, shown in Figure 3.

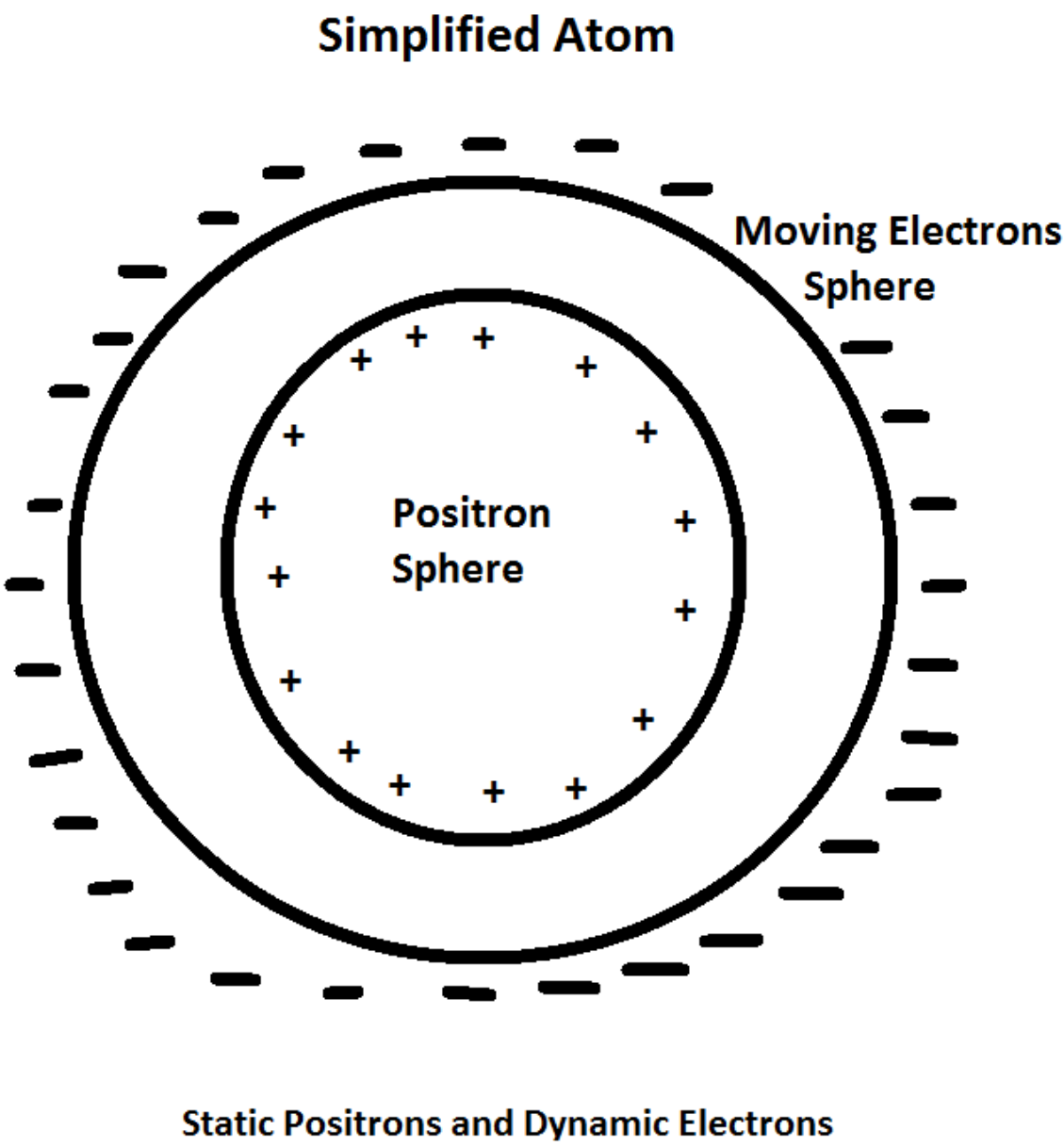

Figure 3. Simplified model for an atom.

Figure 4 explains that a gravitational field is generated around the moving electrons sphere, and the field attracts all types of objects toward the moving electrons sphere. However, air molecules between the positron sphere and the Moving Electrons Sphere should be avoided or at least reduced. Moreover, an adjustment for charges in positron sphere and an adjustment for current passing through the wire may be required. For example, it is assumed in standard models [14] for atom, it is assumed that the total amount of proton charges is equal to the total amount of electron charges in an atom. The reason might be avoiding creation of charge fields outside the atom. Our macro model avoids creation of magnetic field outside the model. But to avoid charge fields outside the model, adjustments may be required for charges in our model.

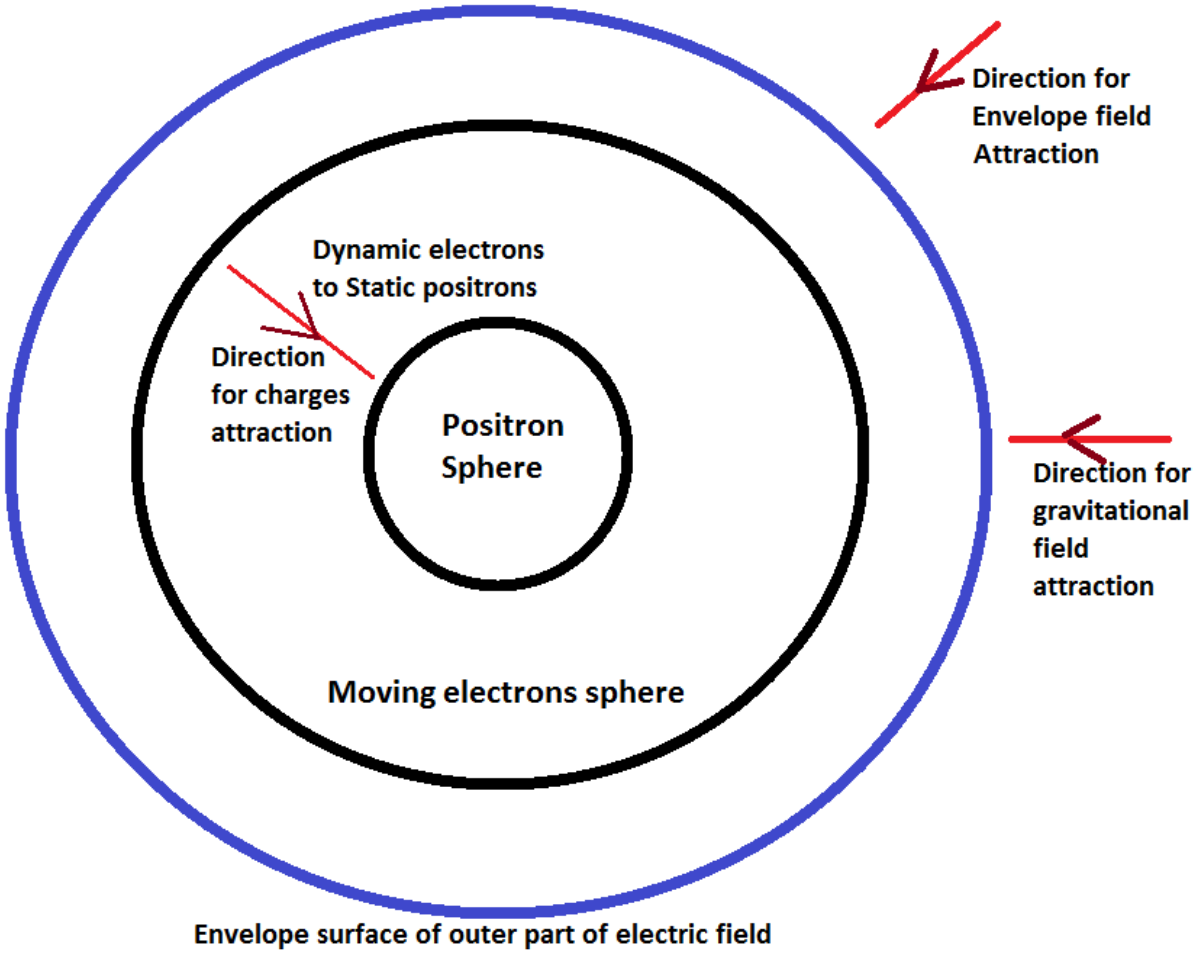

Figure 4. Existence of gravitational field around an atom.

5. UNDERSTANDING ENVELOPE

An effort is taken in this section to understand the concept of envelope without referring to differential geometry. Assume the following situation. A coil of insulated wire is wound around a rod in a particular direction, and a direct current passes through the coil so that circular magnetic lines are produced around each cross section of the wire with same orientation, as illustrated in Figure 5. Then it is possible to draw another common closed curve which touches these circular lines and to have the same orientation as the circular magnetic lines have. The smallest such a closed curve that touches the circular lines with an orientation that coincides with the orientation of the circles is called the envelope of the collection of all circular magnetic lines. But, for our theory, envelope should be considered for surfaces, and the envelopes are also surfaces with an orientation describing a direction from outside to inside.

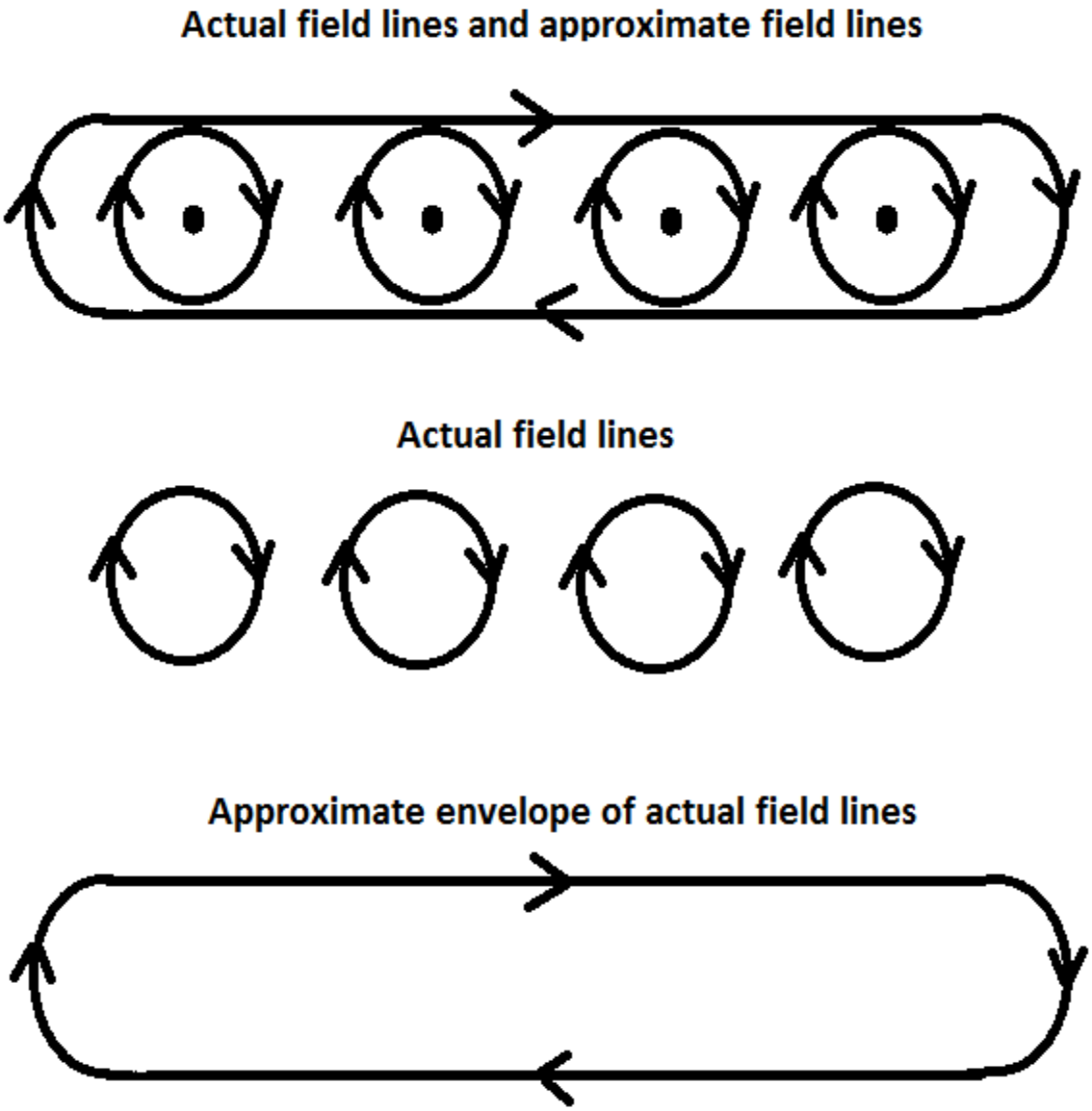

Figure 5. Approximate envelope in plane.

6. APPLICATION: VELOCITY OF ELECTRONS IN AN ATOM RELATED TO RADIOACTIVITY

Electrons revolve around the nucleus part in an atom with some velocity. The velocities of different atoms may also be different. A method to determine these velocities is described in this section as an application of our theory. To describe, let us consider a single atom with an electron with charge $e = 1.60217663 \times 10^{-19}$ Coulomb [6], with a rest mass $m_0 = 9.1093837 \times 10^{-31}$Kilogram [11], and with a relative mass $m_e = m_0/\sqrt{1 - \frac{v^2}{c^2}}$ [15], when the electron moves with a tangential velocity v, and when c is the velocity of light in vacuum. Let us observe that the theory of special relativity is assumed here, and hence its postulate is assumed for this application. Note that $v = c \times \sqrt{1 - \frac{m_0^2}{m_e^2}}$.

This formula is essential to evaluate the value of v. For this purpose, there is a need to evaluate the value for m_e. Now let us refer to Figure 6, which gives two forms of the same atom. The first part of this Figure 6 refers to the charge attraction force towards the collection of all protons from the electron. This force can be described by the expression $k\frac{ne^2}{r^2}$, where n is the number of protons in the atom, r refers to the distance between the nucleus part and the electron, and k is the Coulomb's constant. This expression follows from the Coulomb's law [2, 7, 12], and from the assumption that charge of a proton is equal to the charge of an electron in magnitude. The second part of Figure 6 refers to the gravitational attraction, when M refers to the mass of the nucleus part of the atom [4], which may be considered as the mass of the atom in view of relatively small mass of electrons just for simplicity. This gravitational attraction force [12, 21] is given by the expression $G\frac{Mm_e}{r^2}$, where G is the gravitational constant. Since the charge attraction force should coincide with the gravitational attraction force, then the following relation should be true. $k\frac{ne^2}{r^2} = G\frac{Mm_e}{r^2}$. So, $m_e = \frac{kne^2}{GM}$. This relation can be used to evaluate the value for m_e, and this value can be substituted in the relation $v = c \times \sqrt{1 - \frac{m_0^2}{m_e^2}}$ to evaluate the tangential part v of the velocity of theelectron. Let us observe that v increases as m_e increases, m_e increases as $\frac{M}{n}$ decreases, $\frac{M}{n}$ decreases as $\frac{atomic\ mass}{number\ of\ protons}$ (approximately) decreases, and $\frac{atomic\ mass}{number\ of\ protons}$ decreases as $\frac{number\ of\ neutrons}{number\ of\ protons}$ decreases. Here $\frac{atomic\ mass}{number\ of\ protons}$ is $mass\ of\ an\ electron + mass\ of\ a\ proton + \left(\frac{number\ of\ neutrons}{number\ of\ protons}\right) \times (mass\ of\ a\ neutron)$. Hence, v increases as $\frac{number\ of\ neutrons}{number\ of\ protons}$ decreases and vice versa. But $\frac{number\ of\ neutrons}{number\ of\ protons}$ increases means the possibility for the atom to become more unstable and radioactive is increased. So, if v decreases, then the possibility of the atom becoming more unstable and radioactive is increased. While finding an upper bound of the linear velocity of a beta radiation from a matter consisting of such atoms or ions, v can be used as an upper bound. This is true because the electron naturally emitted outside of atom cannot have a velocity more than the tangential part v of the velocity of the electron revolving in the atom. This is an application for finding different values v for different atoms, even though the values of v are nearly equal to c.

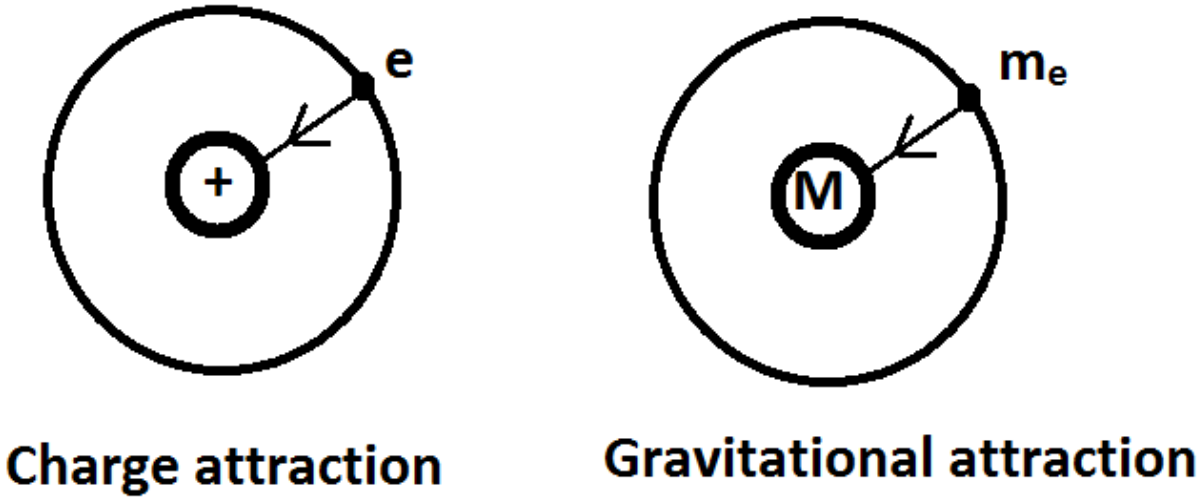

Figure 6. Force as charge attraction and as gravitational attraction.

7. CONCLUSION

Finding an origin for existence of gravitational field is equivalent to finding a reason for existence of gravitational field around an atom. It is found that the existence of the gravitational field around an atom happens because of the movements of the electrons inside the atom. There is a simplified macro model for gravitational field construction. Since this model depends on many parameters, there is a need to wait for implementation. The theory supports a formula for finding velocity of an electron in an atom.

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