Atomic Structure and Mathematical Expression(9)

- The repulsion among electrons act dominantly inside the atom. -

Young sik, Kim *

Abstract

1. All elementary particles permanently continue their autonomous vibration of expansion and contraction, and produce an electric field in the form of waves infinitely. Here, if the vibrational energy of electrons and the wave energy of the electric field takes place, then the attraction and repulsion of electrons would be expressed periodically.

2. Inside an atom, the attraction among electrons can be controlled at a certain limit, but their repulsion increases continuously. Also, the stable orbital radius of electrons is formed when these two forces (attraction and repulsion) intersect each other. The attraction among electrons is dominant in the exterior of the orbital radius while repulsion is stronger in its interior.

3. The surface of an atom is divided by the number of electrons(protons), and there is only one electron in each separate section. Also, the number of divided surfaces has a certain limitation, and the extra electrons form spherical layers of a new phase. The multiple spherical layers which are formed around the atoms determine the "periodic law of chemical elements".

Sequence

Ⅰ. Introduction.

According to the thesis **"The Constituent Elements of Outer Space and the Conditions for the Existence of Light Waves"** which was introduced and discussed earlier, all areas in outer space are filled with the medium of light waves. This is known as **"ether"** in classical physics. However, the medium of light waves is called as **"batangs"** in this study to differentiate it from the ether of classical physics.[6]

    <http://batangs9.com/E-6.pdf>

In the outer space composed of batangs, if the light wave energy at the speed of light got impact, it would be converted to vibrational energy in the stationary state. Also, the vibrational energy in the stationary state infinitely continues its **"autonomous vibration"** of contraction and expansion in place. Here, the **"autonomous vibration"** that act in the current process, and the system of **"autonomous vibration"**(self-oscillation) is permanently conserved(maintenance). In other words, the initial elementary particle is formed through the conservation process of the vibrational energy in the stationary state.[8] <http://batangs9.com/E-8.pdf>

If an elementary particle maintains its autonomous vibration of contraction and expansion, the batangs of the outer space accord with the autonomous vibration of elementary particles, and its concurrence is expressed in terms of the gravitational field, electric field, and nuclear field in the form of waves. In other words, elementary particles of autonomous vibration simultaneously produce these fields which act in the

current process. However, each field will have a different type of structure and functional characteristic.

When the vibrational energy of electrons and the wave energy of the electric field act, the wave energy of the electric field is converted to the kinetic effect of electrons. It means that the kinetic effect of electrons will occur through the sacrificial exhaustion of the wave energy. During this kinetic process of electrons, attraction and repulsion occur repeatedly. However, the attraction and repulsion of the electrons inside the atoms change at different ratios. For example, the attraction of the electrons to protons is controlled at a certain limit, while its repulsion constantly increases at the rate of $\frac{1}{r^2}$.

The attraction and repulsion of electrons at different rates can intersect at one point with the same magnitude. The stable orbital radius of electrons is formed in this intersection. Therefore, the attraction among electrons is dominant outside the orbital radius, while their repulsion is stronger inside the orbital radius.

In the body of the thesis, I will explain the process of converting the wave energy of the electric field to the kinetic effect of elementary particles in terms of actual functions. I will also explain the conditions under which the orbital radius of electrons is formed around the protons and the operating principles from the viewpoint of the substantive function. Moreover, I will introduce the process in which the mechanical structure of an atom is expressed into one equation.

Ⅱ. Body
1. The mathematical expression which shows the process of generating attraction among electrons.
Based on the thesis "Active functions of elementary particles and

interactions with electric force" which was introduced earlier, all sections in outer space is filled with the medium of light waves. Also, all elementary particles permanently maintain their autonomous vibration of contraction and expansion in space composed of batangs and these elementary particles of autonomous vibration infinitely produce an electric field in the form of waves.[8] <http://batangs9.com/E-8.pdf>

The autonomous vibration of protons and electrons act in different forms respectively. The type of positive and negative charges is determined depending on the type of autonomous vibration. Also, the forms of contraction energy and expansion energy are different depending on the type of positive and negative charges. Therefore, the protons' contraction energy and the electrons' expansion energy are constructed in similar forms and in similar shapes.

During the process of autonomous vibration of elementary particles(protons, electrons), contraction energy and expansion energy will have the same magnitude, and maintain a complete equilibrium(balance) permanently. However, the intensity(intension, energy density, pressure) of the contraction energy and expansion energy are different. For example, the contraction energy of protons and the expansion energy of electrons have strong power, while the expansion energy of protons and the contraction energy of electrons have weak power.

In the process of contraction among protons, the contraction wave energy(depressed wave) of a positive electric field is produced, and has a powerful vacuum function. If the contraction wave energy of the positive electric field and the expansion energy of the electrons work, the attraction(forward movement) of the electrons would take effect, but if the contraction wave energy of the positive electric field and that of the electrons act, repulsion among electrons would occur.

In the interaction of electric force, electrons of autonomous vibration move. In other words, electrons of autonomous vibration have a subjective position of motion. Electrons of this subject can be regarded as stationary with respect to the center point of the coordinate system (zero point of axis of coordinates). Therefore, the expansion energy of kinetic electrons is always invariable regardless of the distance. However, the contraction wave energy(depressed wave) of the positive electric field which acts on kinetic electrons changes at a rate of $\frac{1}{r^2}$.

The expansion energy of the electrons and the contraction wave energy of the positive electric force change at different rates respectively. Therefore, they can interchange their magnitude at a certain position(radius of an atom). At this transition point, the expansion energy of the electrons and the contraction wave energy of the positive electric field have the same amount of absolute values and maintain a perfect equilibrium.

The distance of the point at which the contraction wave energy of the positive electric field and the expansion energy of the electrons have the same absolute values is called as "equivalent distance" of the electrons for protons. Here, if the contraction wave energy of the positive electric field, the expansion energy of the electrons, and the "equivalent distance" are assumed to be Wa, Es, and rg, respectively, their relationship is expressed as $Es = \dfrac{Wa}{rg^2}$.

In the exterior of the "equivalent distance(rg)", the expansion energy of the electrons far outweigh the contraction wave energy of the positive electric field(depressed wave). However, the expansion energy of the electrons exhausts all its abilities at the "equivalent distance" point, then

becomes weaker than the contraction wave energy of the positive electric field(depressed wave). It is because the expansion energy of the electrons always maintain its original intensity, and the contraction wave energy of the positive electric field is in inverse proportion($\frac{1}{r^2}$) to the square of the distance.

The attraction of the electrons to the protons has a maximum point at the "equivalent distance". Although the distance between the protons and the electrons becomes closer in the equivalent distance, the attraction among electrons does not increase. In other words, the attraction among electrons is always constant in the interior of the "equivalent distance". However, the repulsion of the electrons to protons continues to increase at a rate of $\dfrac{1}{r^2}$ inside the "equivalent distance".

The attraction and repulsion of the electrons to protons interchange at the point of the "equivalent distance(rg)". In other words, the attraction among electrons has a dominant power compared to the repulsion among electrons at the exterior of the "equivalent distance" and vice versa.[8]
 <http://batangs9.com/E-8.pdf>

The attraction of the electrons to protons inside the equivalent distance is controlled at a certain limit. Therefore, it should be reduced by the amount of its expected increases within the equivalent distance. Here, if the expansion energy of the electrons, the contraction wave energy of the positive field, and the attraction of the electrons are referred to as Es, Wa, and Ae respectively and the expected amount of reduction for the attraction among electrons is called Q, then the electrons' attraction to protons can be expressed as $Ae = Es \times \dfrac{Wa}{r^2} - Q$.

The attraction of the electrons is reduced by the size of Q within the equivalent distance. However, in case of the outside of the equivalent distance, it won't be affected and it is possible to ignore the Q's reduction. It means that Q's reduction is not needed to be applied in the exterior of the equivalent distance(rg). Likewise, the effect in which the attraction of the electrons are reduced by the size of Q within the equivalent distance is shown in Figure 1.
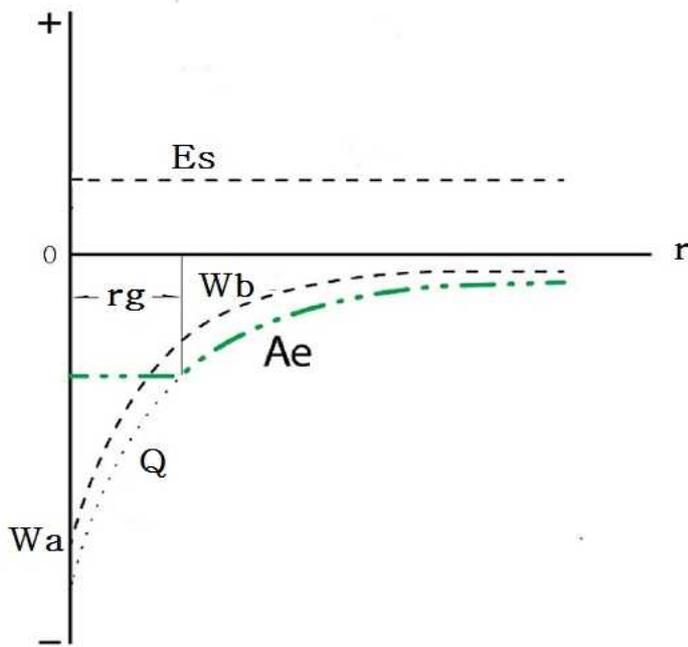

Figure 1. A distribution chart where the attraction(Ae) of the electrons to protons appears.

In Figure 1, + and − signs of the axis of the coordinates represent energy density, 0 is the center of protons, r is the distance between protons and electrons, rg is the equivalent distance, Es is the expansion energy of the electrons, Wb is the contraction wave energy of the positive electric field, Wa is the maximum point of the contraction wave energy, Q's asymptote is the amount of reduction on the attraction, and Ae represents the attraction of electrons to protons. Moreover, in the equivalent distance(rg), the expansion energy of the electrons(Es) and the

contraction wave energy of protons(Wb) have the same absolute value.

As shown in Figure 1, the attraction of the electrons inside the equivalent distance is controlled with a certain limit. In other words, the contraction wave energy of the positive electric field which is much bigger than the expansion energy of the electrons will not be converted into the attraction among electrons. Also, the comprehensive action of the attraction only takes place in elementary particles with autonomous vibration.[1] <http://batangs9.com/E-1.pdf>

2. The mathematical expression of the process in which repulsion among electrons occurs.

All protons maintain their permanent autonomous vibration of contraction and expansion, and infinitely produce a positive electric field in wave form around the protons. Here, the form of the positive electric field consists of the contraction wave energy(a retrograding wave) and the expansion wave energy(an advancing wave). Also, the contraction wave energy of the positive electric field has a vacuum function while the expansion wave energy has a compressive force.

If the expansion energy of the electrons and the expansion wave energy of the positive electric field act, repulsion among electrons which resist repellently will take place. This increases at a rate of $\frac{1}{r^2}$ without any certain limitation. If the expansion energy of the electrons, the expansion wave energy of the positive electric field, and the repulsion of the electrons for protons are assumed to be Es, Wu, and Re respectively, repulsion among electrons is expressed as $Re = Es \times \dfrac{Wu}{r^2}$.

[8] <http://batangs9.com/E-8.pdf>

The effect which happens at the occurrence of repulsion among electrons can be seen in Figure 2. In this figure, the + and − of the axis of the coordinates refer to the energy density, O is the center of the protons, r of the axis of the coordinates is the distance between the protons and the electrons, Es is the expansion energy of the electrons, Wu is the expansion wave energy of the positive electric field, Re is the repulsion of electrons, and Ra is the maximum point of repulsion.

The repulsion(Re) of the electrons to protons increases at a rate of   as shown in Figure 2. However, the repulsion of the electrons to protons(Ae) inside the equivalent distance is controlled at a certain limit of rg as shown in Figure 1. Therefore, the attraction(Ae) and repulsion(Re) of the electrons to protons can have a changeover point with an opposite magnitude.
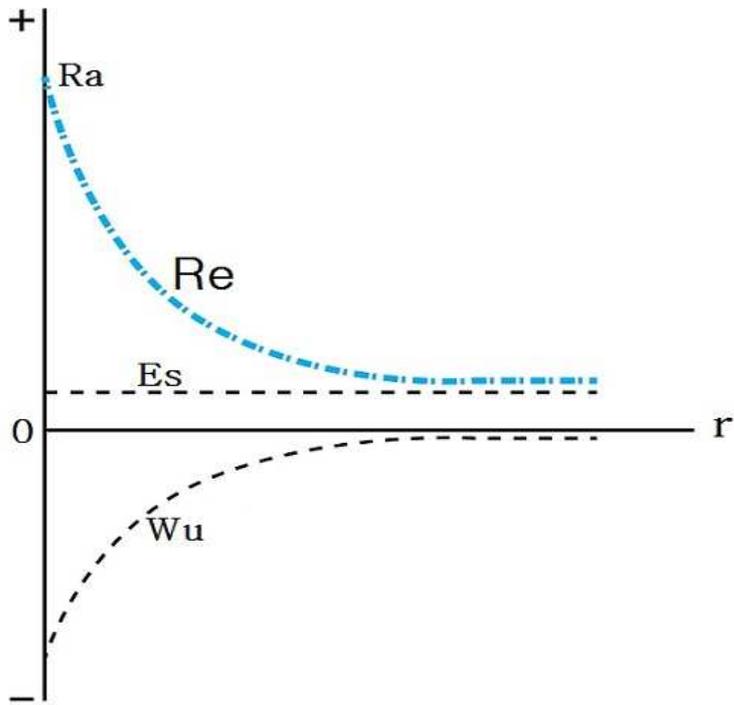

Figure 2. A situation map which shows the distribution of the repulsion(Re) of the electrons to protons.

If the expansion of the electrons and the expansion wave energy of the negative electric field(electric field of the electrons) act, weak repulsion among electrons can occur. Also, if the contraction energy of the electrons and the contraction wave energy of the negative electric field act, weak attraction among electrons takes place. These weak forces can be neglected since they have a very small impact.

3. Conditions in the formation of an atom
and mechanical structure

In the process wherein the electric force of electrons and protons takes place, attraction(Ae) and repulsion(Re) in opposite directions periodically occur. Their superiority and inferiority around the protons is changed to the opposite position. Also, the final effect of attraction and repulsion is expressed in one motion. As a result, the attraction and repulsion among electrons should be synthesized as a single vector.

The effect in which the attraction and repulsion of electrons around protons are synthesized as a single vector can be expressed in the equation $Es \times (\dfrac{Wa}{r^2} - Q + \dfrac{Wu}{r^2})$. Here, the integration power of U which is one synthesized vector consist of the attraction of Ae and the repulsion of Re having a summation structure of $U = Ae + Re$ and is expressed in the form shown in Figure 3.

In Figure 3, the + and − of the axis of the coordinates refer to the energy density, r of the axis of the coordinates is the distance between the protons and the electrons, O is the center of the protons, Ae is the attraction among electrons, Re is the repulsion among electrons, U is the composed vector of the attraction of Ae and the repulsion of Re, and ro represents the normal "orbital radius" of the electrons for protons.
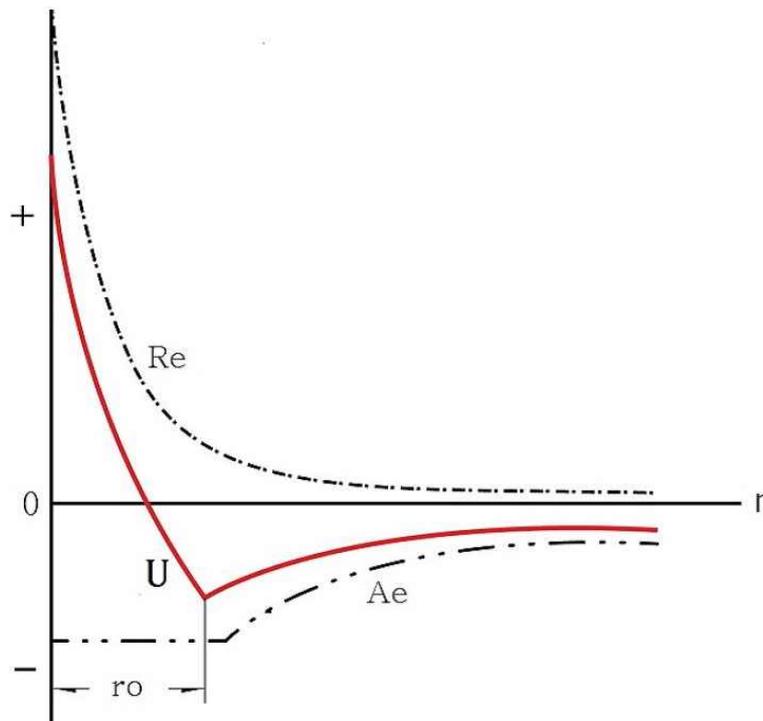
Figure 3. A distribution chart of the integration power(U) which consists of the attraction(Ae) and repulsion(Re) of electrons synthesized as a single vector.

In the normal orbital radius of ro, the attraction(Ae) and repulsion(Re) among electrons have the same absolute values and maintain a perfect equilibrium. Therefore, the electrons in the orbital radius do not have potential energy, and the kinetic effect(falling motion) of the electrons by the integral power of U is not generated. This point(ro) must be formed within the equivalent distance(rg). Moreover, the maximum attraction appears at the orbital radius and so do the maximum repulsion at the surface of protons.

As shown in Figure 3, the orbital radius of ro is formed because the attraction and repulsion of electrons within the equivalent distance are changed at different rates, and their superiority and inferiority intersect at the opposite position. In Figure 3, the orbital radius of ro is a conventional expression to understand it in terms of quantum mechanics.

In other words, in reality, electrons do not have an orbit(route) of the standard trajectory as Niels Bohr claims.

In the orbital radius of ro, electrons of autonomous vibration attract and repulse simultaneously. As a result, the repulsion of electrons is stronger than the attraction among them within the orbital radius of ro, and their attraction is dominant compared to their repulsion outside of the equivalent distance. Under these conditions, electrons cannot randomly deviate from the orbital radius and are constrained in a controlled manner.

The function which controls the movement of electrons in the orbital radius of ro is called **"binding energy of electrons"** for protons(an atomic nucleus). Atomic structure is formed by this **"binding energy of electrons"**. In addition, the atomic orbital radius can only occur as a result of the interaction between protons and electrons, but it cannot take place from the interaction between the protons or electrons.

The relationship between protons and electrons always maintains the distance of the orbital radius, and the distribution of the orbital radius forms the surface of the atomic structure. The electric field of the electrons and protons neutralizes each other on the surface of the orbital radius, and these are not exposed to the outside of the atom. Therefore, the atomic body always has an electrical neutrality.

The wave energy of the positive electric field produced by the protons of the atomic nucleus is spread to all directions. Also, the vibrational energy of the electrons is automatically exercised by the process which accommodate(react) the wave energy of the positive electric field. In other words, the sacrificial exhaustion of the wave energy is expressed as the movement of electrons. As a result, electrons of autonomous vibration

maintain the distance of the orbital radius permanently. Here, the electrons turn actively on the surface of the orbital radius not to let the electric field of the protons escape to the outside of the atom.

The arrangement of protons and electrons that forms the atom is shown at the diagram in Figure 4. Here, P is the proton of the atomic nucleus, O is the center of the atom, E is the electron, ro is the orbital radius of the electrons, and Ob represents the orbital motion of the electrons. Also, the atomic surface can be packed full with the turning orbit of Ob.
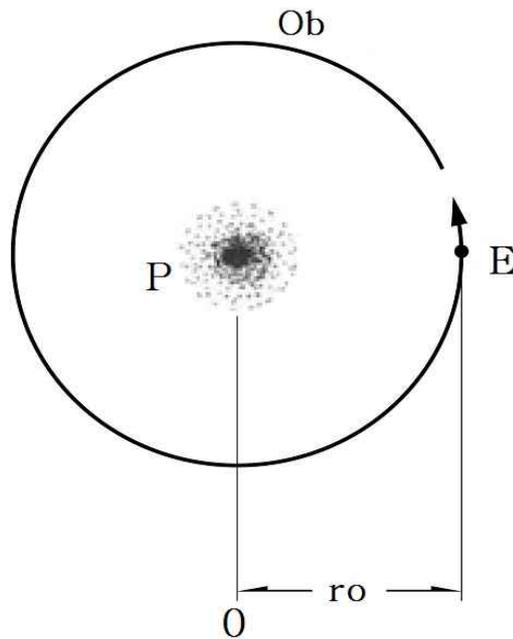

Figure 4. Placement diagram of protons and electrons forming the atomic structure

The electrons of autonomous vibration can freely absorb and release light waves at the speed of light. Also, in the case of electrons of autonomous vibration absorbing light waves, the vibrational energy of the electrons increases. Therefore, the attraction and repulsion produced by the vibrational energy changes and the orbital radius of the electrons for

protons varies. Here, the increase or decrease in the orbital radius means the contraction or expansion of the volume(diameter) of the atom.

If the number of protons in the atomic structure is large, only the mechanical size of the positive electric field increases without any change in the intensity(strength, energy density) of the electric field. In other words, the intensity of the electric field can be determined by the height of the vibrational energy. Moreover, during the process of combining the electric field of two protons, the height of the vibrational energy is not affected by the change. As a result, even if the number of protons constituting the atomic nucleus is large, the orbital radius of the electrons is not enlarged. For example, the volume of helium($_2He^4$) and uranium($_{92}U^{238}$) are of similar magnitude.[1] <http://batangs9.com/E-1.pdf>

The atomic surface is divided by the number of protons, and only one proton will be placed in each divided section of which number is same as the number of protons. For example, the surface of helium is divided into two areas and one proton is arranged in each section. However, the number of divisions on the atomic surface has a certain limit. Here, the extra electrons which exceed the limit of the number of division can form a new level(class) of spherical layer in order.

In the atomic surface, the number of divisions is different in each spherical layer. For instance, the first stage spherical layer is divided into two sections, and the second and third spherical layers are divided into 8 different sections respectively, and lastly the fourth stage or higher spherical layers are divided into 18 sections. Here, each spherical layer reflects the number of protons, and the gap between the spherical layers is assumed to be very small. These step by step procedure of the spherical layer determines the "periodic law of chemical elements".

Ⅲ. Conclusion

The outer space consists of batangs of material elements, and all elementary particles maintain their "autonomous vibration" of contraction and expansion permanently. Here, elementary particles of autonomous vibration simultaneously produce the gravitational field in the form of waves, the electric field, and the nuclear field. However, the wave energy of each field is constructed in different forms and have different functional characteristics.

Elementary particles of autonomous vibration infinitely produce an electric field in the form of waves. Under this condition, elementary particles can be mistaken for having the charge of an actual element. However, this does not exist. In other words, the charge of the actual element which is recognized based on the view of general physics is imaginary and does not exist.

The attraction of electrons to protons within the equivalent distance is controlled at a certain limit. However, the repulsion of electrons continuously increases. In other words, the attraction and repulsion of electrons can be changed at different rates. Furthermore, the stable orbital radius of the electrons can be formed at the point of intersection in which the attraction and repulsion of electrons meet at the same magnitude. The attraction among electrons is dominant outside the orbital radius, while the repulsion among electrons is stronger inside the orbital radius.

The vibrational energy of elementary particles and the wave energy of the electric field act in the process of the electric force. Also, the interaction with electric forces is done automatically by the autonomous vibration of elementary particles. With these viewpoints and its meaning, quantum mechanics in modern physics should be abolished.

Ⅳ. References of the Cyber site

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* Difference becomes specialty, Ideal becomes reality,
              at the center of world in the name of center

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