The Erstwhile Misunderstandings and A New Interpretation of Maxwell's Electromagnetic Wave Equation (29)

– All Types of Electromagnetic Waves Are Composed of Current and magnetic field. That is, the electric field and magnetic field have no structural continuity. –

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Abstract

1. In introducing his electromagnetic wave equation, James Clerk Maxwell's presupposition was that electric field and magnetic field have structural continuity. However, electric field and magnetic field have different forms and different operational principles. As such, electric field and magnetic field cannot be integrated (unity) into one system. Thus, if the integration of electric field and magnetic field is to be denied, Maxwell's electromagnetic wave equation does not hold good.

2. As Michael Faraday's electromagnetic induction demonstrates with actual experience, electric current (or induced electromotive force) and magnetic field have a causal link between them. So, electric current and magnetic field can be integrated into a single system. In introducing his electromagnetic wave equation, however, Maxwell did not reflect the causal link between electric current and magnetic field but replaced the role of electric current with the action of magnetic field. In other words, the role of electric current was dropped for the purpose of employing magnetic field. As such, Maxwell's electromagnetic wave equation distorts the physical significance of electromagnetic induction.

3. When Faraday's electromagnetic induction occurs, the action of electric current creates the magnetic field with a vertical vector (spin action), and a change in magnetic field produces electric current. This relationship between electric current and magnetic field can be expressed in Maxwell's electromagnetic wave equation. In a nutshell, if the structure of electromagnetic wave equation replaces electric field with the action of electric current, the existing electromagnetic wave equation remains valid.

※ **For your reference –** This paper denies some arguments of quantum mechanics, and suggests a new alternative. It is hoped the quantum mechanics of the abolition target will be excluded from the judgment standard.

Ⅰ. Introduction

In rendering his model of electromagnetic wave (the structure and equation of electromagnetic wave), Maxwell's presupposition was that electric field and magnetic field would be incorporated into a system. However, electric field and magnetic field cannot be combined into a single system (unit). It is because magnetic field is not involved in creating electric field and electric field is not involved in creating electric field. In other words, Magnetic field (magnetic force) and electric field (electric force) do not have a causal link (or structural continuity) between them. Furthermore, electric field and magnetic field have different operational principles. Therefore, Maxwell's electromagnetic wave equation, which presupposes the integration of electric field and magnetic field, does not hold good.[6], [17]
<http://batangs9.com/E-6.pdf>, <http://batangs9.com/E-17.pdf>

As Faraday's electromagnetic induction demonstrates empirically, electric current (or induced electromotive force) and magnetic field registers a causal link between them as electromagnetic wave is created. Specifically, a change in magnetic field creates electric current with a vertical vector (spin action), and the action of electric current in turn creates magnetic

field. And such interchange between electric current and magnetic field makes an infinite loop. <u>This causal link between electric current and magnetic field is sufficiently understandable with the help of Fleming's Rule.</u>

In introducing his electromagnetic wave equation, however, Maxwell did not reflect the causal link between electric current and magnetic field but put magnetic field in the place of electric current. In other words, the role of electric current was omitted in adopting the electromagnetic wave equation. Therefore, we should think that Maxwell's electromagnetic wave equation distorted the physical significance of electromagnetic induction.

A major mistake by Maxwell's was with a view to introducing the electromagnetic wave equation, he chose not to reflect electric current. Here, <u>electric current and electric field (electric force) should be strictly distinguished.</u> Namely, electric current is a superficial expression of electron's motion (displacement), whereas electric field refers to the positive function created (discharged) by electrons. Moreover, <u>while electronic motion can create the effect of electric current, electric field and electric current (electron's motion) do not register a casual link between them. Therefore, electric field cannot be serve as an alternative to electric current.</u>

Electric current and electric field have one thing in common: they are created by the role of electrons. Created by the role of electrons, however, electric current and electric field exist in different forms and have different operational principles. As such, electric current and electric field should be treated separately as independent entities. Besides, <u>Maxwell confused the characteristics of electric current with those of electric field and wrongly thought that the attributes of electric current included the elements of electric field.</u>

The electromagnetic waves are only constructed through the combination of electric current and magnetic field. In other words,

electromagnetic waves are not composed of a combination of electric field and magnetic field.

<electromagnetic waves = *electric current* + magnetic field> ←O (OK)

<electromagnetic waves = *electric field* + magnetic field> ←✕ (NO)

On the other hand, the electric field of electrons and the sound of a bell have one thing in common: they occur under the same conditions. And the electric field of electrons and the sound of a bell operate in the same manner. For instance, the bell sound around a bell occurs in the present progressive form, and the magnitude of the bell sound is in reverse proportion to the distance to the second power ($\frac{1}{r^2}$).

Bell sound is created through the activation (vibration) of a bell, and the activation and the sound of a bell register structural continuity. Here, if the existence of the bell is denied, the bell sound does not occur. In other words, where the activation of a bell does not work, the bell sound cannot occur independently. In addition, the activation of a bell and the bell sound have to be linked in the present progressive form.

The electrons of elementary particles create electric field, which has a waveform structure. And the waveform electric field occurs in the present progressive form like the sound of a bell. As is suggested in the afore-mentioned paper, "The Interaction between The Activation of Elementary Particles and Electric Force", the active energy of autonomous vibration operates in the present progressive form inside all elementary particles. Also, due to the autonomous vibration of electrons, the waveform electric field occurs infinitively (permanently). As such, the autonomous vibration of electrons and the waveform electric field register structural continuity.[7], [8] <http://batangs9.com/E-7.pdf>, <http://batangs9.com/E-8.pdf>

As the activation of a bell creates the bell sound in the present

progressive form, the electrons with autonomous vibration create the waveform electric field in the present progressive form. Electric field as such occurs around electrons. Namely, where electrons do not exist, the waveform electric field does not occur independently. In addition, the nuclear field of protons occurs around protons. Of course, where protons do not exist, the nuclear field does not occur independently.

The electrons with autonomous vibration and the waveform electric field register structural continuity. As such, electrons and electric field permanently maintain a partnership (a single regime) and coexist synchronically in limited areas. In their turn, protons and nuclear field register structural continuity. Therefore, protons and nuclear field permanently maintain a partnership and coexist synchronically in limited areas.

Electric field, which has a waveform structure, cannot be bound to (combined with) magnetic field in a controlling manner. And there is no reason why electric field and magnetic field coexist synchronically inside the electromagnetic wave. In a nutshell, Maxwell's electromagnetic wave constructed through the combination of electric field and magnetic field is nothing but a fictitious, conceptual model that does not exist.[17]
  <http://batangs9.com/E-17.pdf>

In the main section of this paper, the model of electromagnetic wave constructed through the regimentation of electric current and magnetic field shall be introduced. Further, it will be explained the reason why electric field was used as an alternative to electric current in Maxwell's electromagnetic wave equation. Lastly, the physical significance of Maxwell's electromagnetic wave equation will be interpreted from a perspective of its positive function.

Ⅱ. Body
Modern physics (electrodynamics) has so far understood that

electromagnetic wave is constructed through the combination of electric field and magnetic field and that the relationship between electric field and magnetic field maintains the structure of a vertical vector. Electromagnetic wave as such is expressed as shown in the diagram in Figure 1. In the diagram in Figure 1, E on the Y-axis is for electric field, B on the X-axis is for magnetic field, and the arrow on the Z-axis is for the direction in which electromagnetic wave travels.[17]
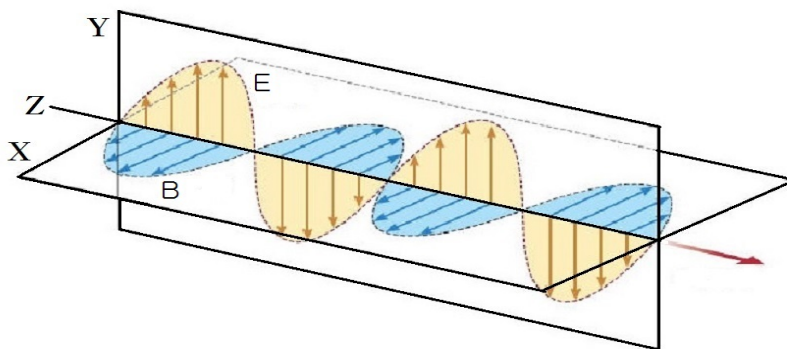
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Figure 1: The Diagram of the Electromagnetic Wave Constructed through the Regimentation of Electric Field and Magnetic Field.

As he argued for the connectivity between electric field and magnetic field, Maxwell expressed the connectivity between electric field and magnetic field in the electromagnetic wave equation. For instance, Maxwell's electromagnetic wave equation introduced electric field as a substitute for electric current. Here, unless one presupposes the combination between electric field and magnetic field, the form of the electromagnetic wave is not constructed.

Theory of the absolute in this paper argues for a causal link between electric current and magnetic field. An understanding of this new argument may be facilitated by comparing various types of "electromagnetic waves". Here, the electromagnetic waves are divided into two kinds of models. For example, the structure of the waveform electromagnetic wave, which occurs around an electrical wire (electric

current), is totally different from that of the particulate electromagnetic wave, which is discharged by electrons.[17] <http://batangs9.com/E-17.pdf>

As for the waveform electromagnetic wave that occurs around an electrical wire, it is called "Radio wave (Radio electromagnetic wave)", for convenience's sake. As such, "Radio wave" include longwave, shortwave, ultra-short wave, and microwave. To be specific, the motion of electrons is expressed as the action of electric current, and the action of electric current creates "Radio wave". On the other hand, the electrons of elementary particles emit particulate electromagnetic waves. As for the particulate electromagnetic wave thus discharged from electrons, it is called "light wave (photon)", for convenience's sake. As such, "light waves" are generated inside electrons and include infrared light, visible light, ultraviolet light, and x-ray.

The waveform Radio wave is created by the motion of electrons (electric current). And conductive wire can absorb the waveform Radio wave. Thus, displacement current (motion of electrons) and voltage occur inside the wire that has absorbed the Radio wave. However, conductive wire cannot generate particulate light wave and does not absorb the light wave. Even if a conductive wire absorbs the light wave, displacement current and voltage are not generated inside the wire.

Electrons at rest can discharge or absorb the particulate light wave. And thermal energy (electric charge, electric force) is preserved inside the electrons at rest that have absorbed the light wave. However, electrons do not generate or absorb the waveform Radio wave. If electrons inside a microwave are affected by the Radio wave (microwave), the thermal energy of light wave is generated with the fierce motion of electrons, and this thermal energy of light wave can be absorbed into electrons. Namely, after the Radio wave is converted to thermal energy (light wave), the thermal energy makes inroads into electrons.

The waveform Radio wave that has been generated by the electric current (motion of electrons) in the electrical wire is diffused (distributed) into the wide area of the outer space. And the energy density (wave height, compressive force) of Radio wave is in inverse proportion to the distance to the second power ($\frac{1}{r^2}$). However, the light wave emitted from electrons at rest gets the object unit of particle model. Here, the object unit of light wave permanently maintains the original form (light pressure frequency) and is propagated to the last boundary of the outer space for several billions of years. Provided that the light wave with such conditions is propagated, the quantity of light wave is in inverse proportion to the distance to the second power ($\frac{1}{r^2}$).[17], [19] <http://batangs9.com/E−17.pdf>, <http://batangs9.com/E−19.pdf>

The form of Radio wave and the form of light wave have one common feature composed of identical elements. For example, the form of Radio wave is constructed through the combination of electric current and magnetic field. And the form of light wave is also constructed through the combination of electric current and magnetic field. In the propagation of Radio wave and light wave, however, the electric current performs different roles, and the magnetic field plays different roles. In other words, the electric current of Radio wave and that of light wave are propagated under different conditions, and the magnetic field of Radio wave and that of light wave are also propagated under different conditions.

Magnetic field wave is generated by the electric current of the electrons in motion. So, we may infer that the kinetic energy of electrons is converted to the wave energy of Radio wave. However, light wave is discharged from inside the electrons at rest in the particulate form. We may infer that some of the elements that constructed electrons during the generation of light wave have been discharged (dislocated) as the particulate

form of light wave.

The wave height of Radio wave is determined by the frequency of electric current. To be specific, the higher the frequency of electric current is, the higher wave height and the shorter wavelength the form of Radio wave gets. However, the magnitude of light wave (wave height, light pressure) is decided inside electrons. For example, when an electron absorbs a plural number of light waves simultaneously, the multiple light waves are synthesized into one single vector inside the electron. The synthesis of light waves as such is expressed as the modulation of light pressure (wave height, frequency), and the modulation of light pressure works as the function that causes the energy level.[19]
 <http://batangs9.com/E-19.pdf>

The electromagnetic wave constructed through the combination of electric current and magnetic field cannot have the diagram as shown in Figure 1. For instance, conductive wire cannot create the electromagnetic wave as shown in Figure 1, and conductive wire cannot absorb the electromagnetic wave as shown in Figure 1. Of course, the electrons of elementary particles cannot generate electromagnetic wave as shown in Figure 1, and the electrons cannot absorb the electromagnetic wave as shown in Figure 1. In a nutshell, the structure of the electromagnetic wave as expressed in the form of Figure 1 is a fictitious, conceptual model that does not exist.

As has been described so far, the model of Radio wave and that of light wave have different structures. Also, the waveform Radio wave and the particulate light wave are propagated under different conditions. Therefore, the characteristics of Radio wave and those of light wave are expressed in different forms. The differentiated characteristics of Radio wave and light wave should be separated and treated as individual positions.

1. The Structure and Characteristics of Radio wave

As is suggested in the afore-mentioned paper, **"The Structure and the Functional Characteristics of Electromagnetic Wave"**, electric current refers to the motion of electrons, and magnetic field with a vertical vector occurs around electric current. This generation of magnetic field can be clearly understood with the held of Fleming's Rule, which is expressed in the situation diagram as shown in Figure 2.[17]

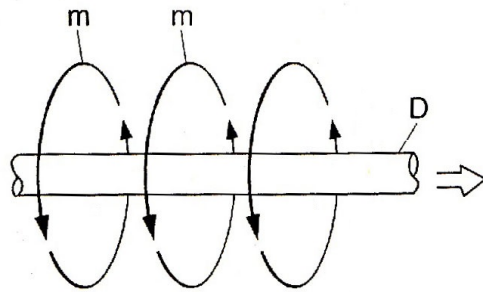<http://batangs9.com/E-17.pdf>

Figure 2: The Situation Diagram Showing the Generation of magnetic field with a vertical vector by the Motion of Electrons (electric current).

D in the situation diagram as shown in Figure 2 is for the conductive wire, the large arrow of ⇒ is for the direction of electric current, and m is for the magnetic field with a vertical vector (spin action). Here, the magnetic field of m is dispersed in all directions of the outer space and subsists in the condition of spatialization. Namely, the magnetic field of m occurs in the outer space that receives the stress of electric current, and the magnetic field of m reflects the characteristics of the outer space. Here, we can infer that the foundation of the outer space has the components of magnetic field (constituents).

When alternating electric current passes through the wire of D, Radio wave with a vertical vector occurs around the wire (D) as shown in the cross-section diagram in Figure 3. In the cross-section diagram in Figure

3, D at the center is for the conductive wire that leads into screen, the round-shaped m_1, m_2, m_3, and m_4 that are formed around the wire (D) are for Radio wave, the small arrows of the Radio wave (m_1, m_2, m_3, m_4) are for the direction (directionality) in which the magnetic field is applied, and the big arrow of ⇒ is for the direction in which the Radio wave travels.
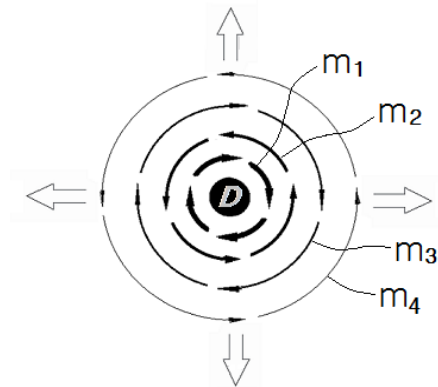

Figure 3: The Cross-Section Diagram Showing the Generation of Alternating Radio wave around the Wire (D).

The Radio wave in Figure 3 penetrates the outer space. And in the outer space which the Radio wave penetrates, "electric current" with a vertical vector (spin action) occurs. As for the electric current with a vertical vector that thus occurs in the outer space, it is called "space current", for convenience's sake. As such, "space current" of Radio wave may be defined as the displacement (mobility) of spatial elements. Namely, "space current" of Radio wave refers to wind in the space (flow of Pyeongs). Furthermore, the "space current" of Radio wave and the ordinary current of the electrons in motion share the effects that perform the identical functions and are distinguished only by the difference in the amount of electric current.

"space current" of Radio wave that occurs in the outer space has the properties of induced electromotive force. In other words, the induced electromotive force refers to the "space current" and the "space current" is expressed as the action of induced electromotive force. Moreover, the

<u>magnetic field of Radio wave and the space current (induced electromotive force) with a vertical vector are mutually interchangeable.</u> Therefore, the magnetic field of Radio wave and the space current with a vertical vector permanently maintain their partnership.

The process in which the magnetic field of Radio wave and the space current maintain their partnership in the outer space can be more clearly understood through the "electromotive force generator" marked as A and B in Figure 4. In Figure 4. A is for the perspective view that describes the "electromotive force generator", and B is for the cross-section diagram of A.[24] <http://batangs9.com/E-24.pdf>
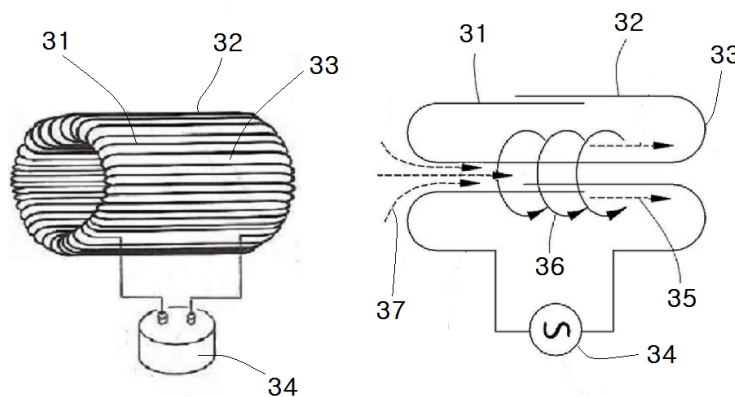

Figure 4: The Perspective View and the Cross-Section Diagram for the ConFigureuration of the Electromotive Force Generator.

In the perspective view and the cross-section diagram in Figure 4, 31 is for the conductive wire for the electric current, 32 is for the coil of the conductive wire with a straight sector, 33 is for the cylindrical electromotive force generator in which the center line of the coil (32) turns around in a circle, 34 is for the alternating power supply, 35 is for the direction in which electric current travels, 36 is for the magnetic field with a vertical vector that has been generated by the "electromotive force generator (33)", and 37 is for the space current of the induced electromotive force that has been created by the magnetic field with a

vertical vector (36).

As shown in the cross-section diagram in Figure 4, when alternating electric current (34) is supplied to the electromotive force generator (33), the electric current (35) in the coil that flows to right generates magnetic field (36) with a vertical vector whereas the magnetic field (36) with a vertical vector in turn generates the space current (37) for the induced electromotive force that is displaced to right. Therefore, the space current (37) and the electric current (35) in the coil in effect are applied in the same direction at all times. In a nutshell, the space current (37) and the electric current (35) in the coil register structural continuity through the magnetic field (36) with a vertical vector.

As the space current (37) and the magnetic field (36) with a vertical vector register structural continuity, the propagation of the Radio wave (m_1, m_2, m_3, m_4) as shown in Figure 3 creates the space current (not indicated in the diagram) with a vertical vector. Here, the magnetic field of the Radio wave and the space current can permanently maintain their regimentation in partnership. In other words, the magnetic field of the Radio wave are converted to the space current with a vertical vector, and the space current with a vertical vector (rotation direction) is converted to the magnetic field of the Radio wave in an infinite loop.[17]
  <http://batangs9.com/E-17.pdf>

The form of the electromagnetic wave is maintained through the permanent repetition of the interchange between the magnetic field and the space current. Namely, the interchange between the magnetic field and the space current is expressed in the form of electromagnetic wave. As such, the electromagnetic wave refers to the circular regimentation of the magnetic field and the space current.

Through the propagation of the Radio wave (m_1, m_2, m_3, m_4) as shown in Figure 3, the electric current in the wire (D) generates the space current

with a vertical vector, and this space current with a vertical vector in turn generates the Radio wave. So, <u>the electric current in the wire</u> (D) <u>and the space current of the Radio wave are applied in the same direction at all times.</u> In sum, the electric current in the wire and the space current of the Radio wave are linked into a single system through the magnetic field with a vertical vector.

Through the propagation of the magnetic field wave of the Radio wave, the magnetic field wave represent the waveform model while the space current with a vertical vector takes a supporting role. Here, the magnetic field wave are constructed as a longitudinal wave model like sleep wave, and the magnetic field wave of the longitudinal wave model are propagated at the speed of light (C). Furthermore, the magnetic field wave and the space current permanently repeat their effective interchange, and the interchange between the magnetic field wave and the space current always takes place in the present progressive form. <u>The clustering of the electromagnetic waves are formed through the interchange between the magnetic field wave and the space current.</u>[17]

   <http://batangs9.com/E-17.pdf>

At the point in the outer space where the magnetic field wave of the Radio wave penetrate, the space current with a vertical vector occurs. Once the magnetic field wave of the Radio wave have passed it, however, the space current in the outer space vanishes instantly where it used to be. In other words, the magnetic field wave are propagated at the light of speed, and the space current with a vertical vector goes through creation and annihilation where it used to be. Therefore, the space current reflects the properties of the outer space and does not go out of its proper location. For instance, <u>the foundation of the outer space preserves the space current, and the magnetic field wave penetrate the foundation of the outer space at the speed of light (C).</u>[19]

   <http://batangs9.com/E-19.pdf>

Through the propagation of electromagnetic waves, the space current with a vertical vector does not blindly follow the magnetic field wave. But, the space current always occurs additionally at the position where the magnetic field wave pass. This relationship between the magnetic field wave and the space current can be more clearly understood with the help of Fleming's Rule. Thus, if the space current occurs additionally at the position where the magnetic field wave pass, one may misperceive it as tandem displacement of the magnetic field wave and the space current.

2. The Structure and Characteristics of Light Wave

Electrons at rest can instantaneously discharge light wave at the speed of light and instantaneously absorb (accommodate) light wave at the speed of light. Therefore, it is believed that electrons at rest are not constructed as hard solids but register their proper activation. In sum, as is suggested by the paper mentioned earlier, "The Structure and Activation of Elementary Particles", all kinds of elementary particles permanently carry on with "autonomous vibration" between contraction and expansion.[7] <http://batangs9.com/E-7.pdf>

Inside all elementary particles, the active energy at the speed of light operates in the present progressive form. Thus, the active energy at the speed of light that operates in the present progressive form infinitely generates electric field, nuclear field, gravitational field, and inertial force, and the electric field, nuclear field, and gravitational field provide the causative conditions for the motion of other elementary particles. Therefore, elementary particles can both create and react to energy field. In addition, the autonomously vibrating elementary particles can instantaneously discharge or absorb the light wave (photon) at the speed of light.[25] <http://batangs9.com/E-25.pdf>

The light wave that is discharged from the autonomously vibrating elementary particles is constructed as a particulate model. And through

its propagation at the speed of light, the light wave of the particulate model works as electric current. As for the function as electric current which is created during the propagation of light wave, it is called "photocurrent". Here, the "photocurrent" of light wave is compared to the electric current of the electrons in motion under the same conditions. As such, the photocurrent of light wave and the electric current of the electrons in motion are distinguished only by the difference in size (volume, quantity) and are propagated according to the identical operational principle.

Around the photocurrent that penetrates the outer space, the magnetic field with a vertical vector occurs as befits Fleming's Rule. As for this magnetic field of light wave, it is called "photomagnetic" for convenience's sake. Here, the photocurrent and the photomagnetic of light wave are interchanged in an infinite loop. Hence, the photocurrent and the photomagnetic of light wave are compared as equal values and remain in an interdependent relationship.[17]
 <http://batangs9.com/E-17.pdf>

The photocurrent and the photomagnetic of light wave are constitute the object unit through their interchange. Such light wave in the object unit has both the elements of the photocurrent and the photomagnetic. And through the propagation of light wave, the photocurrent represents the particulate model, while the photomagnetic with a vertical vector performs the supporting role. So, the implementation of the speed of light (*C*) in the propagation of light wave is led by the photocurrent. Namely, the photocurrent of light wave is propagated at the speed of light of C.

At the position in the outer space where the photocurrent of light wave penetrates, the photomagnetic with a vertical vector occurs. Once the photocurrent of light wave has passed it, however, the photocurrent in the outer space vanishes instantly where it used to be. In other words, the photocurrent of light wave is propagated at the light of speed, and

the photomagnetic with a vertical vector goes through creation and annihilation where it used to be. Therefore, the photomagnetic reflects the properties of the outer space and does not go out of its proper location. For instance, the foundation of the outer space preserves the photomagnetic, and the photocurrent penetrates the foundation of the outer space at the speed of light (C).

The photomagnetic of light wave does not blindly follow the photocurrent. But, the photomagnetic always occurs additionally at the position where the photocurrent passes. This relationship between the photomagnetic and the photocurrent can be more clearly understood with the help of Fleming's Rule. Thus, if the photomagnetic occurs additionally at the position where the photocurrent passes, one may misperceive it as tandem displacement of the photomagnetic and the photocurrent.[17]
 <http://batangs9.com/E-17.pdf>

While the photocurrent and the photomagnetic are interchanged, the components of light wave in the object unit are not dispersed (deconstructed) in all directions. So, the object unit of light wave can be propagated for up to several billion light years like soliton wave. This object unit of light wave has so far been misperceived in quantum mechanics as light quantum (photon). The interdependence between the photocurrent and the photomagnetic can be more clearly understood through the diagram as in Figure 5.

In the diagram in Figure 5, Pe is for the photocurrent that is propagated with the elastic force at the speed of light, the big arrow of ⇒ is for the direction in which the photocurrent travels, Mf is for the photomagnetic with a vertical vector that has occurred in the front of the photocurrent, Mr is for the photomagnetic with a vertical vector that has occurred in the rear of the photocurrent, and the small arrows of ↑ and

↓ are for the directionality of the magnetic field (Mr, Mf). Here, the directionality of ↑ that is held by the photomagnetic of Mf and the directionality of ↓ that is held by the photomagnetic of Mr are applied in the opposite directions.
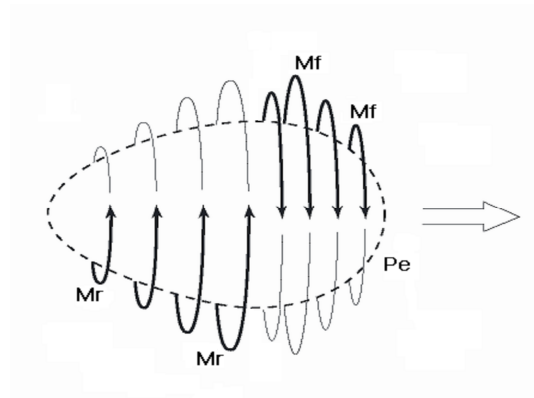

Figure 5: The Diagram for the Light Wave Constructed through the Clustering of the photocurrent and the Photomagnetic.

As shown in the diagram in Figure 5, great compressive force forms and the photomagnetic with a rightward rotation vector (Mf) occurs in the front of the photocurrent (Pe). As such, the photomagnetic in the front gets high energy density and is distributed in a small area. However, low vacuous force forms and the photomagnetic with a leftward rotation vector (Mr) occurs in the rear of the photocurrent (Pe). As such, the photomagnetic in the rear gets low energy density and is distributed in a large area.

The great compressive force of the photomagnetic that has occurred in the front of the photocurrent (Mf) performs a superior function, whereas the low vacuous force of the photomagnetic that has occurred in the rear of the photocurrent (Mr) performs an inferior function. In the situation with these conditions, one may misunderstand that the photomagnetic in the front (Mf) alone is expressed saliently while the photomagnetic in the rear (Mr) does not exist.

The light wave in the object unit that is discharged from electrons at

rest is arranged with disorderly intervals before and after. To put it another way, the light wave in the object unit cannot be distributed in the waveform model with a continuous structure. However, as a number of light waves are massed in a small area, the photomagnetic (Mr) of the front light wave (A) and the photomagnetic (Mf) of the rear light wave (B) get opposite rotation vectors, and the photomagnetics (Mr, Mf) of the two light waves (A, B) work reciprocally.[19] <http://batangs9.com/E-19.pdf>

If a number of light waves pass through a small thin layer, the front light wave (A) and the rear light wave (B) can be arranged at regular intervals through the interaction of the photomagnetics (Mr, Mf). Here, the intervals before and after two light waves (A, B) are in inverse proportion to energy density (light pressure, wave height). For example, the higher the light pressure (wave height) of photocurrent is, the narrower the intervals before and after the light waves become. The regular intervals before and after the light waves acts as such function to cause interference.

The photocurrent and the photomagnetic of light wave have a round-shaped cross section. However, if the photocurrent and the photomagnetic of light wave come under the influence of polarized plate, liquid crystal, reflection, diffraction, refraction etc., the photocurrent and the photomagnetic of light wave are transformed into an oval cross section. Here, the light wave that is transformed into an oval cross section acts as such function to cause polarization.

3. The Physical Significance of Electromagnetic Induction and the Logical Flaws in the Electromagnetic Wave Equation

Maxwell introduced the electromagnetic wave equation to express Faraday's electromagnetic induction in a mathematical form. As such, Maxwell's electromagnetic wave equation is divided into the differential type and the integral type. And the electromagnetic wave equation of the

differential type has the structure of $\nabla \times E = -\dfrac{\partial B}{\partial t}$, and the electromagnetic wave equation of the integral type has the structure of $\oint_C E \cdot dI = -\dfrac{d}{dt}\int_S B \cdot dA$ Here, E is for electric field, B is for magnetic field, dI is for vector component, and dA is for the vertical vector component.

In introducing the electromagnetic wave equation, Maxwell thought that a change in magnetic field creates electric field, and a change in electric field creates magnetic field. However, as is suggested by Faraday's electromagnetic induction, the magnetic field and the electric field are not integrated into a single system. In other words, the structure of electromagnetic wave (magnetic field+electric field) introduced by Maxwell is nothing but a fictitious, conceptual model that does not exist.[17]
<http://batangs9.com/E-17.pdf>

As far as Faraday's electromagnetic induction is concerned, magnetic field and electric current (space current, induced electromotive force) have a causal link between them. However, in introducing his electromagnetic wave equation, Maxwell did not reflect the causal link between electric current and magnetic field. It is because he put electric field in the place of electric current. This form of electromagnetic wave equation carries a logical contradiction.

Faraday's electromagnetic induction and Maxwell's electromagnetic wave equation do not register structural continuity. Therefore, Faraday's electromagnetic induction should be interpreted with an operational principle with some other conditions. Besides, Maxwell's electromagnetic wave equation should be revised to carry some other conceptual logic.

As is suggested by the electromotive force generator in Figure 4, the increase or decrease in electric current creates a variable magnetic field

with a vertical vector, and a change in magnetic field creates electric current with a vertical vector (space current, induced electromotive force). To express this causal link between the magnetic field and the electric current, we need Maxwell's electromagnetic wave equation. In a nutshell, if the electric field is replaced with the action of electric current in Maxwell's electromagnetic wave equation, the existing electromagnetic wave equation remains valid.

Maxwell's electromagnetic wave equation is constructed in the form of $\nabla \times E = -\dfrac{\partial B}{\partial t}$. Here, the sign of E means not electric field but electric current. It is because in introducing his electromagnetic wave equation, Maxwell put electric field in the place of electric current. Therefore, when Maxwell's electromagnetic wave equation is actually used, the relationship between the electric current and the electric field is expressed in the form of $\nabla \times E = -\dfrac{\partial B}{\partial t}$, and E represents the electric current.

Ⅲ. Conclusion

Electric field and magnetic field do not register structural continuity and cannot be combined into a single system. However, in introducing the electromagnetic wave model (the structure and equation of electromagnetic wave), Maxwell assumed that the functions of electric field and magnetic field would combine into a single system. Therefore, Maxwell's electromagnetic wave model carries a logical contradiction.

Electromagnetic wave is constructed through the combination of electric current and magnetic field and not through the combination of electric field and magnetic field. However, Maxwell's electromagnetic wave equation ignored the causal link between electric current and magnetic field, thus putting electric field in the place of electric current. As such, Maxwell's electromagnetic wave equation distorts the physical significance

of electromagnetic induction.

Faraday's electromagnetic induction reflects the relationship between magnetic field and electric current (space current, induced electromotive force). Here, a change in magnetic field generates the electric current with a vertical vector and the action of electric current in turn generates the magnetic field with a vertical vector. The form of electromagnetic wave is conFigured by this interchange between magnetic field and electric current. In addition, the circular system of magnetic field and electric current that conFigures the electromagnetic wave is permanently preserved.

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