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Logical Experiments on Fundamental Laws of Electromagnetism

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Abstract: The validity of the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field, the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force, the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor, and the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field were all tested using Logical experiments. It was discovered that all these four fundamental laws of electromagnetism violate the law of causality, violate the law of conservation of energy, and all have logic defects in their construction processes, therefore, all of them are logically untenable. Correspondingly, the Biot-Savart law of electromagnetism does not hold true either, it is also logically untenable. The results of the Logical experiments indicate that the whole of a closed loop (that is, the entire closed loop) is the minimum physical unit required to generate an electromagnetic phenomenon, any part of this minimum physical unit, such as conductor segment Δl, differential conductor segment dl, current element Idl, or independent moving charge (/charge beam), cannot generate any electromagnetic phenomenon. Electromagnetic phenomena, such as the so-called Ampère force, the so-called motional electromotive force, the so-called Oersted's magnetic field and the so-called Lorentz force, are all generated by the whole of a closed loop with a change in magnetic flux (/in magnetic induction intensity) within the closed loop, but not generated as the relevant law of electromagnetism states. For the so-called Lorentz force, the closed loop is consisting of the independent moving charge beam and displacement currents.

Keywords: Logical experiments; Fundamental laws of electromagnetism ;Violate the law of causality ;Violate the law of conservation of energy; Logic defect in law construction processes; The whole of a closed loop being the minimum physical unit required to generate any electromagnetic phenomenon.

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1. Introduction

Six years ago, in a project, electrical motors and electrical generators were designed and fabricated strictly based on the fundamental laws of electromagnetism. Although these electrical motors and electrical generators fully comply with the fundamental laws of electromagnetism, such as the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field and the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force, all of them completely failed in physical experiment tests. It is entirely unbelievable that these electrical motors and electrical generators completely failed in the physical experiment tests, however, there must be something wrong with the fundamental laws of electromagnetism, as there is no other plausible explanation.

Therefore, the validity of the Ampère force law [1] which states that a current-carrying conductor experiences a force in a magnetic field, the Faraday's law [2] of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force, the Oersted's law [2] of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor, and the Lorentz force law [1] which states that an independent moving charge experiences a force in a magnetic field were all tested using Logical experiments. It was then discovered that the so-called Ampère force law, the so-called Faraday's law of motional electromotive force, the so-called Oersted's law of electromagnetism, and the so-called Lorentz force law all violate logics. That is, the whole of a closed loop is the minimum physical unit required to generate an electromagnetic phenomenon, all electromagnetic phenomena are generated by the whole of a closed loop with a change in magnetic flux (/in magnetic induction intensity) within the closed loop. Any part of this minimum physical unit is incapable of achieving any electromagnetic phenomenon. A conductor segment Δl, a differential conductor segment dl, a current element Idl, or an independent moving charge cannot generate any electromagnetic phenomenon. In other words, it was discovered that a current-carrying conductor itself does not experience a force in a magnetic field, a conductor cutting through magnetic field lines itself does not generate an electromotive force, a current-carrying conductor itself does not generate a magnetic field and an independent moving charge itself does not experience a force in a magnetic field.

In addition, in fact, up to date, humans have never experimentally detected a force on an independent current-carrying conductor which is alone in a magnetic field without the influence of changes in magnetic flux within the closed loop consisting of the conductor, caused by the motion of the current-carrying conductor. Moreover, humans have never experimentally detected a motional electromotive force on an independent conductor which is alone in a magnetic field and cuts through magnetic field lines without the influence of changes in magnetic flux within the closed loop consisting of the conductor, caused by the motion of the conductor. Furthermore, humans have never experimentally detected a magnetic field around an independent current-carrying conductor without the influence of changes in magnetic flux within the closed loop consisting of the current-carrying conductor, caused by the change of current of the closed loop. Additionally, humans have never experimentally detected a force on an independent moving charge which is alone in a magnetic field without the influence of changes in magnetic flux within the closed loop consisting of the independent moving charge, caused by the motion of the independent moving charge. Although, independent moving charge appears to be an independent beam, it actually is an inalienable part of closed loop of electric field, since when a charge starts to move, it definitely creates displacement currents and forms closed loop of electric field. Actually, none of these four fundamental laws of electromagnetism described above were concluded with true adherence to physical experiments or derived with rigorous logical reasoning. However, they are widely trusted and commonly used, such as in the Biot-Savart law and in Maxwell's equations [3].

It reveals a fundamentally different electromagnetic nature of the world, depending on whether the electromagnetic phenomena are generated, as the fundamental laws of electromagnetism stated, by conductor segment Δl, differential conductor segment dl, current element Idl, and independent moving charge, or by the whole of a closed loop with a change in magnetic flux (/in magnetic induction intensity) within the closed loop. This is an extremely important scientific question that should have been addressed earlier; however, it still remains unclear to date. In this study, the closed loop can be a conductor closed loop, a closed loop consisting of displacement currents, or a closed loop consisting of the current (beam) of independent moving charge, and it is referred to general closed loop. It is extremely important to rigorously test the validity of the four fundamental laws of electromagnetism stated above, as they form the foundation of electromagnetism, classical physics, and modern physics. In this article, the results obtained through Logical experiments are presented.

2. Logical experiments prove that four fundamental laws of electromagnetism violate the law of causality

2.1. Logical experiments to test whether the Ampère force law violates the law of causality

As illustrated in Figure 1, the Ampère force law states that a current-carrying conductor experiences a force in a magnetic field. However, assume there is a current-carrying conductor in a uniform magnetic field, and the current-carrying conductor is set to be perpendicular to the magnetic field lines, as illustrated in Figure 2. Now, if Person X is riding on this current-carrying conductor and is facing the direction of the current, then, Person X will find that the existence situation and interacting relationship between the magnetic field and the current-carrying conductor on the left side of the current-carrying conductor are exactly the same as the existence situation and interacting relationship between the magnetic field and the current-carrying conductor on the right side of the current-carrying conductor. This means that the existence situation and interacting relationship between on the left side and the right side of the current in the current-carrying conductor are exactly the same. Therefore, the force on both the left side and the right side of the current is in symmetrical equilibrium state, and likewise the left side and the right side of the current-carrying conductor are also in symmetrical equilibrium state. Therefore, according to the law of causality, there will be no force which can push a current-carrying conductor in a uniform magnetic field to the left side or to the right side, since there is no cause for any directed interaction here. For the same reason, there will be no force which can drive a current in a uniform magnetic field to the left side or to the right side. In other words, this symmetrical equilibrium state means that neither the current nor the current-carrying conductor can experience a force in the magnetic field to the left side or to the right side. Therefore, neither the current-carrying conductor itself nor the current itself experiences a force in a uniform magnetic field. Regardless of how the directions of the magnetic field and the current are adjusted, this conclusion will remain unchanged. So far, the claimed so-called Ampère forces of the current-carrying conductor in a magnetic field are all determined by the left-hand rule, no matter whether it is a uniform magnetic field or not, and whether there is a magnetic field gradient or not on the left side or on the right side of the current-carrying conductor. This means that even if the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field does hold true, the direction of the so-called Ampère force is still only determined by the direction of the current and the direction of the magnetic field. All these points mean that the existence situation and interacting relationship between the magnetic field and the current-carrying conductor itself on the left side and the right side of the current-carrying conductor is in a symmetrical equilibrium state, regardless of whether it is in a uniform magnetic field or in a non-uniform magnetic field. All these points also mean that the existence situation and interacting relationship between the magnetic field and the current itself on the left side and the right side of the current are in a symmetrical equilibrium state, regardless of whether it is in a uniform magnetic field or in a non-uniform magnetic field. It is irrefutable logic that in order to be subjected to a force in a certain direction, it is necessary to have a cause of the force in the same direction, that is, it must have a directional existence situation and interacting relationship in the same direction. This is the necessity determined by the law of causality, and it is irresistible. However, there is no directional existence situation and interacting relationship on either the left side or the right side of a current-carrying conductor, when the current-carrying conductor is in a magnetic field, even if in the direction perpendicular to the magnetic field. Therefore, neither the current-carrying conductor itself nor its current itself can experience a force in a magnetic field, nor does it have the possibility of doing so. The reason why a directional force is observed in physical experiments which is claimed to obtain the Ampère force is that the directional force is not generated by the current-carrying conductor which possesses the non-directional existence situation and interacting relationship between the magnetic field and itself on the right side and the left side of itself, but it is generated by the whole of the closed loop consisting of the current-carrying conductor, which possesses the directional existence situation and interacting relationship between the magnetic field and the closed loop, when it is loaded with a current. These findings indicate that the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field violates the law of causality and is logically untenable, therefore, it cannot hold true.

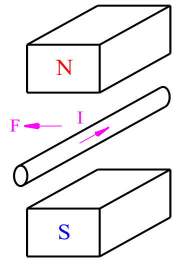

Figure 1: A schematic illustration of the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field.

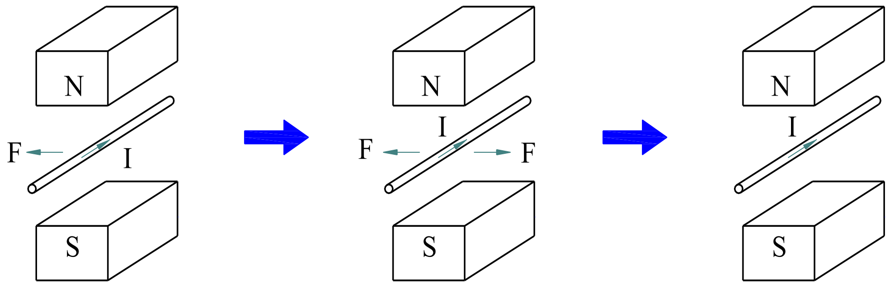

Figure 2: A schematic illustration of the disproving of the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field.

2.2. Logical experiments to test whether the Faraday's law of motional electromotive force violates the law of causality

As illustrated in Figure 3, the Faraday's law of motional electromotive force states that a conductor cutting through magnetic field lines generates an electromotive force. However, as illustrated in Figure 4, if there is a conductor in a magnetic field, and then the conductor is set to be perpendicular to the magnetic field lines, and to be cutting through the magnetic field lines. Now, if Person X is sitting on this conductor and facing the moving direction of the conductor which is cutting through magnetic field lines, then, Person X will find that even if the magnetic field lines possess a displacement effect on charges, such as electrons, inside the conductor on which the Person X is sitting, the tendency of the electrons to move to the Person X's left side is exactly the same as the tendency of the electrons to move to the Person X's right side. Thus, there is no way for a conductor cutting through magnetic field lines to make electrons or other charges inside the conductor to move in one direction along with the conductor to generate an electromotive force. These findings indicate that it is impossible for a conductor cutting through magnetic field lines to make charges, such as electrons, inside the conductor to move in one direction of the conductor. That is, it is impossible to move charges in a conductor by making the conductor to cut through magnetic field lines. Therefore, it is impossible for a conductor to generate an electromotive force merely by cutting through magnetic field lines. In fact, the claimed so-called motional electromotive force, appearing to be generated by a conductor cutting through magnetic field lines, is actually not generated by the conductor that is cutting through magnetic field lines, but is generated by the whole of a closed loop consisting of the conductor which is cutting through magnetic field lines, with a change in magnetic flux within the closed loop. In order to achieve a certain directional event, there must be a cause for the achievement of the directional event, that is, there must be an existence situation and interacting relationship for the achievement of the directional event. This is the necessity determined by the law of causality, and it is irresistible. However, the process of a conductor cutting through magnetic field lines does not possess a directional existence situation and interacting relationship for charges to move in one direction along with the conductor to generate an electromotive force. Therefore, a conductor cutting through magnetic field lines itself does not generate an electromotive force, nor does it have the possibility of generating an electromotive force. The reason why a directional electromotive force (/current) is observed in physical experiments which is claimed to obtain motional electromotive force in a conductor of cutting through magnetic field lines is that the directional electromotive force (/current) is generated by the whole of the closed loop consisting of the conductor cutting through magnetic field lines, which possesses the directional existence situation and interacting relationship between the magnetic field and the closed loop, when the closed loop is moving in certain ways. These findings indicate that a conductor cutting through magnetic field lines itself does not generate an electromotive force, and that the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force violates the law of causality and is logically untenable, therefore, it cannot hold true.

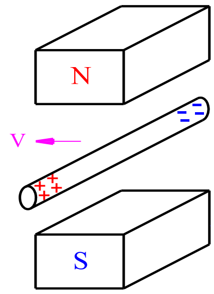

Figure 3: A schematic illustration of the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force.

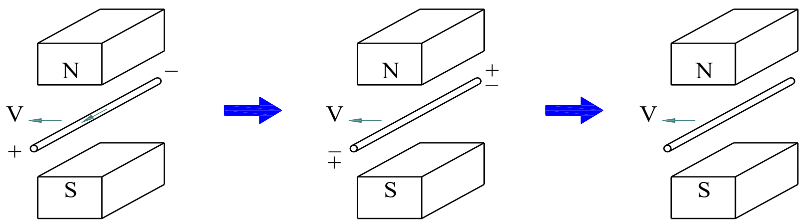

Figure 4: A schematic illustration of the disproving of the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force.

2.3. Logical experiments to test whether the Oersted's law of electromagnetism violates the law of causality

As illustrated in Figure 5, the Oersted's Law of electromagnetism states that a current-carrying conductor generates a circular magnetic field surrounding the conductor. However, as illustrated in Figure 6, if there is a current-carrying conductor, now if Person X is riding on this conductor and facing the direction of the conductor's current, then, Person X will find that even if the current-carrying conductor on which he is riding generates a magnetic field surrounding the conductor, but the possibility of generating a magnetic field surrounding the conductor under the right-hand rule is exactly the same as that it is under the left-handed rule. This is because, for a current-carrying conductor, things at the clockwise direction and the counterclockwise direction are perfectly symmetrical. Thus, no directional magnetic field surrounding the conductor can be generated. Therefore, it is impossible for a current-carrying conductor to generate a magnetic field surrounding the conductor determined by either the right-hand rule or by the left-handed rule. That is, a current-carrying conductor cannot generate any magnetic field, since the generating of a magnetic field under the right-hand rule or under the left-handed rule is all the possibilities that the magnetic field generated by a current-carrying conductor can choose. That is, the current-carrying conductor does not have the possibility of generating a magnetic field. So far, the claimed so-called Oersted's circular magnetic field, which appears to be generated by a current-carrying conductor, is actually not generated by a current-carrying conductor, but is generated by the whole of a closed loop consisting of the current-carrying conductor, with a change in magnetic flux within the closed loop. In order to achieve a certain directional event, there must be a cause for the achievement of the directional event, that is, there must be an existence situation and interacting relationship for the achievement of the directional event. This is the necessity determined by the law of causality, and it is irresistible. However, a current-carrying conductor does not have the existence situation and interacting relationship that can generate a magnetic field surrounding itself in the direction perpendicular to the current. Therefore, current-carrying conductors do not generate magnetic fields and do not have the possibility of generating magnetic fields. The reason why a directional magnetic field is observed in experiments which is claimed to obtain the Oersted's magnetic field generated by a current-carrying conductor is that the directional magnetic field is not generated by the current-carrying conductor which possesses the non-directional existence situation and interacting relationship surrounding itself, but it is generated by the whole of the closed loop consisting of the current-carrying conductor with a change in magnetic flux within the closed loop, which possesses the directional existence situation and interacting relationship, when it is loaded with a current. These findings indicate that a current-carrying conductor does not generate magnetic fields, and that the Oersted's law of electromagnetism states that a current-carrying conductor generates a circular magnetic field surrounding the conductor violates the law of causality and is logically untenable, therefore, it cannot hold true. Consequently, the Biot-Savart law cannot hold true either.

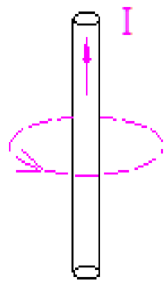

Figure 5: A schematic illustration of the Oersted's Law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor.

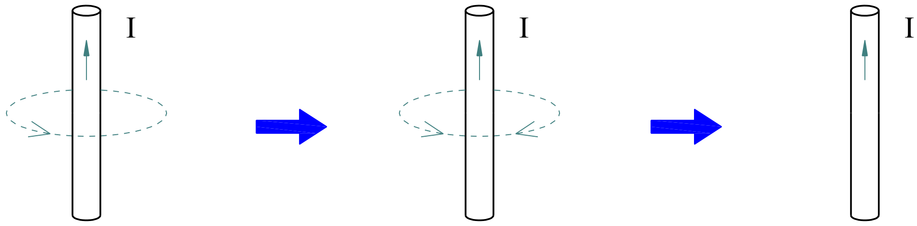

Figure 6: A schematic illustration of the disproving of the Oersted's Law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor.

2.4. Logical experiments to test whether the Lorentz force law violates the law of causality

As illustrated in Figure 7, the Lorentz force law states that an independent moving charge experiences a force in a magnetic field. However, as illustrated in Figure 8, if there is a charge injected into a magnetic field in the direction not parallel to the magnetic field lines, now if Person X is sitting on this charge and facing the direction of the charge's movement, then, Person X will find that even if the charge on which he is sitting experiences a force in the magnetic field, but the force on this charge towards the left side is exactly the same as the force towards the right side, since the existence situation and interacting relationship on the left side and the right side of the charge are exactly the same. Thus, when the charge is moving in a magnetic field, it cannot be driven to the left or to the right. Therefore, it is impossible for an independent moving charge in a magnetic field itself to experience a force determined by either the left-hand rule or the right-hand rule. That is, an independent moving charge does not experience a force in a magnetic field itself, nor does it have any possibility of experiencing a force in a magnetic field itself. So far, the claimed so-called Lorentz force observed in physical experiments is not generated by the independent moving charge in the magnetic field itself, but is generated by a closed loop consisting of the current (beam) of the independent moving charge with a change in magnetic flux within the closed loop. In order to achieve a certain directional effect, it must have the cause for the achievement of this directional effect, that is, it must have the existence situation and interacting relationship which can achieve this directional effect. This is the necessity determined by the law of causality, and it is irresistible. However, the independent moving charge in a magnetic field itself does not have a directional existence situation and interacting relationship between the magnetic field and itself. Therefore, the independent moving charge does not experience a force in a magnetic field and does not have the possibility of experiencing a force. These findings indicate that an independent moving charge in a magnetic field itself does not experience a force, and that the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field violates the law of causality and is logically untenable, therefore, it cannot hold true.

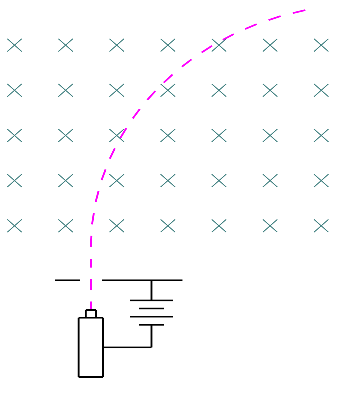

Figure 7: A schematic illustration of the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field.

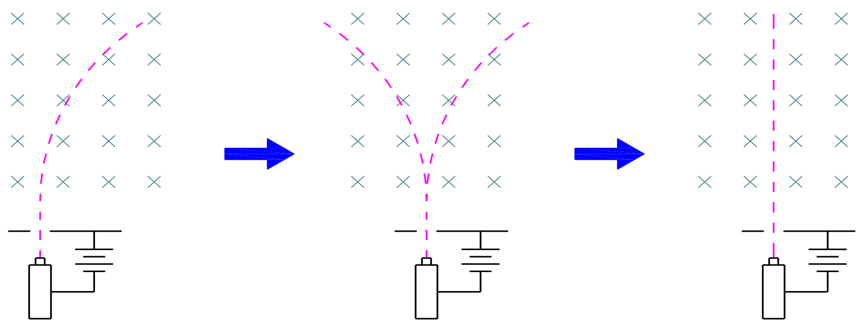

Figure 8: A schematic illustration of the disproving of the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field.

3. Logical experiments prove that four fundamental laws of electromagnetism violate the law of conservation of energy

3.1. Logical experiments to test whether the Ampère force law violates the law of conservation of energy

In the field of electromagnetism, it is widely accepted that the force experienced by a current-carrying conductor in a magnetic field is the interaction force between the magnetic field generated by the current-carrying conductor and the external magnetic field in which the current-carrying conductor is located. In other words, the Ampère force is the interaction force between the circular magnetic field surrounding the current-carrying conductor generated according to the Oersted's law of electromagnetism and the external magnetic field in which the current-carrying conductor is situated, as illustrated in the left side of Figure 9. This means that the force acting on the current-carrying conductor within an external magnetic field is the interaction force between the circular magnetic field and the external magnetic field in which the circular magnetic field is located, rather than a direct force between the current-carrying conductor itself and the external magnetic field in which the current-carrying conductor is located. Additionally, the force acting on the current-carrying conductor in an external magnetic field is not due to that the current-carrying conductor's current itself interacts directly with the external magnetic field in which the current is located, this is because the different fields cannot interact directly with each other. As illustrated in the middle of Figure 9, if permanent magnets are used to construct a circular magnetic field permanent magnet which possesses the identical circular magnetic field as that the current-carrying conductor generates according to the Oersted's law of electromagnetism stated above. Then if this circular magnetic field permanent magnet is set in an external magnetic field, it will be forced, moved in the direction perpendicular to the magnetic field lines of the external magnetic field. In other words, the circular magnetic field permanent magnet will output work. Now, let the force on the circular magnetic field permanent magnet be F, the external work power be W, as illustrated in the middle of Figure 9. This clearly violates the law of conservation of energy, effectively creating a perpetual motion machine, as the circular magnetic field permanent magnet outputs work power W without any energy consumption or changes in the magnetic field circumstance. Therefore, the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field violates the law of conservation of energy and is logically untenable, therefore, it cannot hold true.

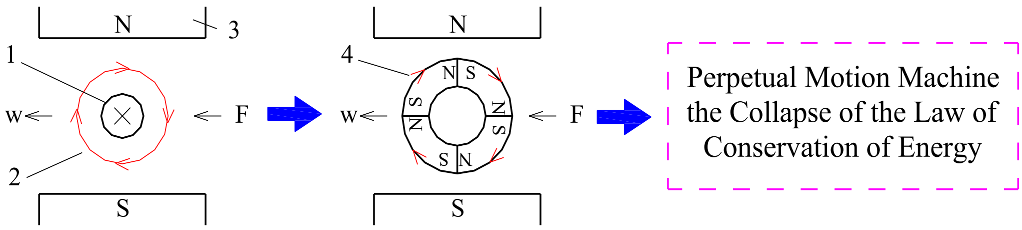

Figure 9: A schematic illustration of a Logical experiment to test whether the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field violates the law of conservation of energy. 1. Current-carrying conductor, 2. Circular magnetic field, 3. Permanent magnets, 4. Permanent magnets of circular magnetic field.

3.2. Logical experiments to test whether the Faraday's law of motional electromotive force violates the law of conservation of energy

As illustrated in the left side of Figure 10, if it is assumed that the conductor cutting through magnetic field lines generates an electromotive force, then the electromotive force must be generated by the movement of the charges inside the conductor, thus there must a kind of electric current inside the conductor which is cutting through magnetic field lines. Therefore, the electromotive force generated by a conductor cutting through magnetic field lines must be the electric energy created by electric current generated by a conductor cutting through magnetic field lines. However, this electric energy is created out of nothing, since the movement of the conductor cutting through the magnetic field lines which generates the electric current does not encounter resistance from the magnetic field lines being cut through, and therefore, the movement of the conductor cutting through magnetic field lines does not consume energy. This is because, as demonstrated above, that a current-carrying conductor does not experience a force in a magnetic field. That is, if the resistance force F which the movement of the conductor cutting through magnetic field lines encounters is zero, then the energy consumption E_F of the movement must be zero. However, the energy output Ee of the motional electromotive force generated by the movement of the conductor cutting through the magnetic field lines is greater than zero. Therefore, if the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force does hold true, then a conductor cutting through magnetic field lines will generate an electromotive force without energy consumption, thereby this process violates the law of conservation of energy. Therefore, the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force violates the law of conservation of energy and is logically untenable, therefore, it cannot hold true.

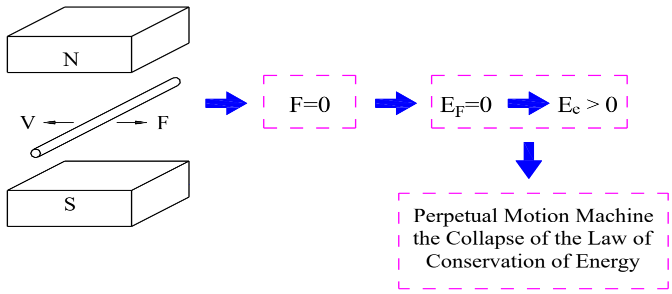

Figure 10: A schematic illustration of a Logical experiment to test whether the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force violates the law of conservation of energy.

3.3. Logical experiments to test whether the Oersted's law of electromagnetism violates the law of conservation of energy

Inductance is indispensable for converting electrical energy into a magnetic field, it is impossible to conduct this conversion without inductance. Inductance is a nature of the whole of a closed loop, and the whole of a closed loop is a necessary condition for the existence of the inductance and inductive reactance. Without the whole of a closed loop, there is certainly no inductance or inductive reactance. Inductance is formed by the whole of a closed loop, but not by a conductor segment Δl, or a differential conductor segment dl, or a current element Idl, or by an independent moving charge.

Inductance is only related to the integer number of turns in a closed loop winding, and is unrelated to the increase or decrease of a conductor less than one turn. If there is an inductance in a conductor segment Δl, or in a differential conductor segment dl, or in a current element Idl, or in an independent moving charge, then, the increase or decrease of the conductor and as such with less than one turn of a closed loop winding will inevitably affect the inductance of the closed loop. Consequently, the inductance calculation formula would need to account for the increase or decrease of the conductor less than one turn. However, the increase or decrease of the conductor less than one turn has not been included in the inductance calculation formula, as such changes do not affect the inductance of the closed loop winding.

Therefore, none of a conductor segment Δl itself, a differential conductor segment dl itself, a current element Idl, and an independent moving charge itself is inductive, or has inductance. Additionally, neither inductance nor inductance reactance is formed before a closed loop of integer turns is formed. This means that a conductor segment Δl itself and a differential conductor segment dl itself will neither encounter the resistance of inductive reactance, nor consume electrical energy due to inductive reactance, when a current is applied to them. It is impossible to generate a magnetic field, without consuming energy due to inductive reactance, otherwise, the law of conservation of energy would be violated. Therefore, a current-carrying conductor does not generate a magnetic field, otherwise, the law of conservation of energy would be violated. As illustrated in the left side of Figure 11, if the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor does hold true, then the circular magnetic field generated by the current-carrying conductor does not consume energy, and is thus created out of nothing. That is, as illustrated in the middle of Figure 11, since inductance L is equal magnetic flux Φ divided by current I (that is, $L=\Phi/I$), if $L=0$, then Φ must be 0, however, the magnetic field energy $E_\Phi > 0$, thus if the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor does hold true. Therefore, the law of conservation of energy is violated, resulting in the creating of a perpetual motion machine. Thus, the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor violates the law of conservation of energy, and has no way to hold true. Of course, Biot-Savart law correspondingly does not hold true. In addition, because magnetic field and electric field are mutually convertible within one process, therefore if Oersted's law of electromagnetism which state that a current-carrying conductor generates a circular magnetic field around itself does hold true, a conductor inserted into the axis of a circular magnetic field generated by permanent magnets must continuously output electrical energy. This is obviously contrary to the law of conservation of energy. Thus, the current-carrying conductor cannot generate magnetic field, and the Oersted's law of electromagnetism violates the law of conservation of energy and is logically untenable, therefore, it cannot hold true.

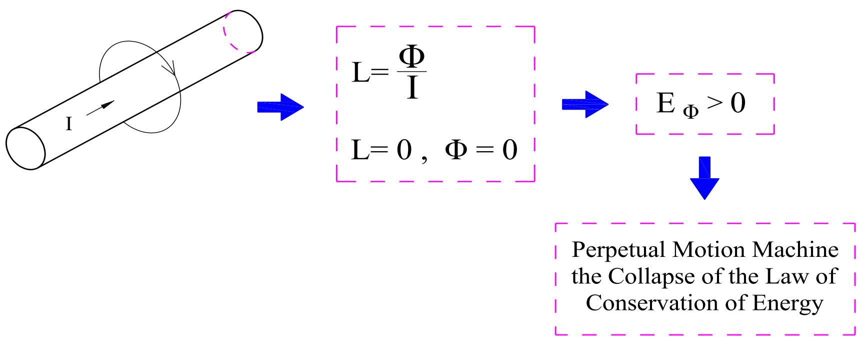

Figure 11: A schematic illustration of a Logical experiment to test whether the Oersted's Law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor violates the law of conservation of energy. L is the inductance, Φ is the magnetic flux, and I is the current, E_Φ is the magnetic field energy.

3.4. Logical experiments to test whether the Lorentz force law violates the law of conservation of energy

As illustrated in the left side of Figure 12, a charge tunnel 2 is placed in a magnetic field generated by the permanent magnets 1 and is oriented perpendicular to this magnetic field. The charge tunnel 2 is confined to a track 4, allowing it to move only in a direction perpendicular to itself. In this case, the charge tunnel 2 moves along the track 4 in the direction F with velocity Vx as illustrated in the left side of Figure 12. It is assumed that a charge emitting device attached to the charge tunnel 2 injects a positive charge 3 into the charge tunnel 2 with velocity Vy along the axis of the charge tunnel 2. The mass of the positive charge 3 is m_0. And it is assumed that the composite velocity of Vx and Vy is V. These three velocities are the velocities measured in the reference frame of the magnetic field of the permanent magnet 1. The kinetic energy E possessed by the positive charge 3 is:

$$E = (1/2)\ m_0V^2$$

In this case, if the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field does hold true, and assuming no friction between the positive charge 3 and the charge tunnel 2, then the positive charge 3 will move with velocity V in the charge tunnel 2 with the magnetic field of the permanent magnet 1 as the reference frame. It will experience a Lorentz force perpendicular to its velocity V, and this Lorentz force is denoted as F. This Lorentz force F will create a component force in the direction of the motion of the charge tunnel 2, i.e., in the direction of Vx, and let this component force be Fw. The component force Fw will force the charge tunnel 2 to continue moving in the direction perpendicular to itself, that is, in the direction of Vx, resulting in the charge tunnel 2 outputting work with power W. Assuming the motion speed of the charge tunnel 2 remains Vx (which can be achieved by adjusting the magnetic induction intensity of the permanent magnet 1 and/or adjusting the external work load), then the relationship between Vx, Vy and V is maintained. Since the velocity of the positive charge 3 in the charge tunnel 2 with the magnetic field of the permanent magnet 1 as the reference frame remains unchanged at velocity V, then the kinetic energy of the positive charge 3 itself also remains unchanged at E. However, if the energy generated by the power of the external works W is denoted as Ew, then Ew is greater than zero and accumulates over time. But in fact, this energy Ew is generated out of nothing. That is, in this process, the system energy input is the E, the system energy output is E + Ew, where Ew is greater than zero and accumulates over time. So, the system energy output exceeds its energy input, thus this process violates the law of conservation of energy. Therefore, the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field violates the law of conservation of energy and cannot hold true, thus the moving charge itself cannot experience a force in a magnetic field.

Even if there is friction between the moving charge and the charge tunnel 2, then when the charge moves in the charge tunnel 2, its velocity decreases and its kinetic energy decreases, but the reduced kinetic energy will be released in the form of heat. So, it will not change the fact that the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field violates the law of conservation of energy, nor does it change the fact that the moving charge itself does not experience a force in a magnetic field.

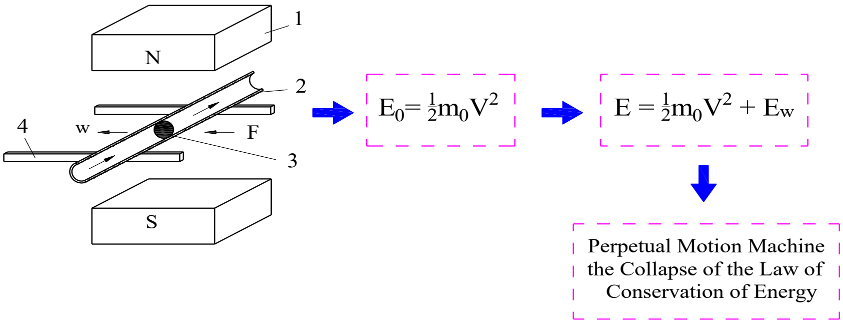

Figure 12: A schematic illustration of the first Logical experiment to test whether the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field violates the law of conservation of energy. 1. Permanent magnets, 2. Charge tunnel, 3. Positive charge, 4. Track.

Moreover, as illustrated in the left side of Figure 13, it is assumed that a bent energy-dissipating charge pipe 2, that consumes energy if bent, is placed in an external magnetic field 1 and is oriented perpendicular to the external magnetic field 1. If a charge 3 (assumed the charge is a negative charge in Figure 13) is injected into the bent energy-dissipating charge pipe 2 along the axis of the bent energy-dissipating charge pipe 2. The mass of the charge 3 is m and its velocity is V. If assume that there is no friction between the charge 3 and the bent energy-dissipating charge pipe 2, then the kinetic energy possessed by the charge 3 which is the energy input to the system is:

$$E=（1/2）mV^2$$

Now, if the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field does hold true, then the circular motion trajectory of the charge 3 is determined by the equation:

$$BVQ = mV^2/R + Fc$$

wherein, B is the magnetic induction intensity of the external magnetic field 1, V is the speed of the movement of the charge 3, Q is the charge quantity of the charge 3, m is the mass of the charge 3, R is the radius of the circular motion of the charge 3, Fc is the force required to bend the bent energy-dissipating charge pipe 2, and Fc is generated by the Lorentz force and is part of the Lorentz force. Since Fc is perpendicular to the velocity V of the charge 3, Fc does not change the velocity V of the charge 3. However, since the force Fc must force the bent energy-dissipating charge pipe 2 to bend, the force Fc has to do work on the bent energy-dissipating charge pipe 2, and it will consume energy. If assume that the amount of this energy consumption is E_F, then the amount of this energy consumption E_F is generated by the Lorentz force. From this formula, it can be seen that if the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field does hold true, the Lorentz force will generate extra energy E_F out of nothing in the system, under the condition that the kinetic energy of the moving charge is not reduced.

In other words, if the system energy input is E, and if the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field does hold true, then the system energy output will be $E_T = E + E_F$, E_F is greater than zero, that is:

$$E_T = E + E_F > E$$

Therefore, the Lorentz force causes the system energy output becomes greater than the system energy input, without any energy consumption. Therefore, the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field violates the law of conservation of energy, thus the moving charge itself does not experience a force in a magnetic field. That is, the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field is logically untenable, therefore, it cannot hold true.

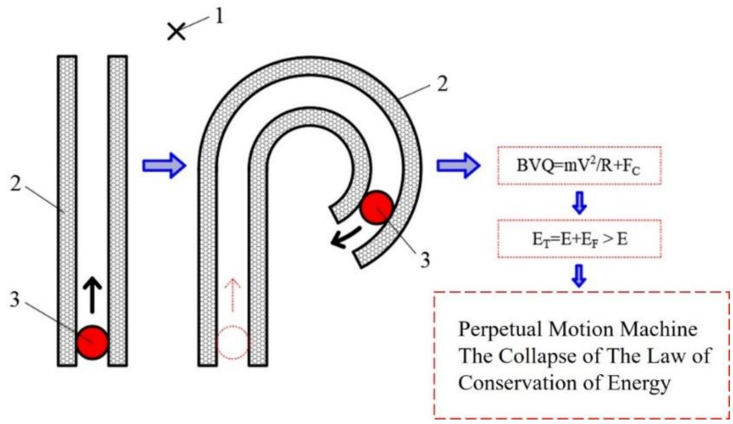

Figure 13: A schematic illustration of the second Logical experiment to test whether the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field violates the law of conservation of energy. 1. Magnetic field, 2. The bent energy-dissipating charge pipe, 3. Charge.

Even if there is friction between the charge 3 and the bent energy-dissipating charge pipe 2, when the charge 3 moves in the bent energy-dissipating charge pipe 2, its motion speed will decrease and its kinetic energy will decrease, but the reduced kinetic energy will be released in the form of heat. Thus, it will not change the fact that the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field violates the law of conservation of energy, nor does it change the fact that the independent moving charge itself does not experience a force in a magnetic field.

The so-called Lorentz force that appears to be the force generated by the independent moving charge in a magnetic field is actually not generated by the independent moving charge itself in the magnetic field, but generated by the whole of the closed loop where the independent moving charge and displacement currents are located in.

According to the Logical experiments conducted above, none of the so-called Ampère force, the so-called motional electromotive force, the so-called Oersted's magnetic field, or the so-called Lorentz force does actually exist. The observed related electromagnetic phenomena are generated by the whole of the closed loop consisting of the conductor or the moving charge and displacement currents. That is, the whole of a closed loop is the minimum physical unit required to generate an electromagnetic phenomenon, any part of this minimum physical unit is incapable of achieving any electromagnetic phenomena.

4. Logical experiments prove that four fundamental laws of electromagnetism have logic defects in their construction processes

4.1. Logical experiments to test whether the Ampère force law has logic defects in its construction processes

In a physical experiment as illustrated in the lower part of Figure 14, it was observed that a closed loop's current-carrying conductor experiences a force and moves when it is placed in a magnetic field. Based on this observation, electromagnetic scientists extracted the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field, as illustrated in the upper part of Figure 14. This force is termed as the

Ampère force and this Ampère force is considered to be F = BILsinβ, where I is the current strength, L is the length of the current-carrying conductor, B is the magnetic induction intensity, sin is the sine function, and β is the angle between the current direction and the magnetic field direction. However, in the physical experiment as illustrated in the lower part of Figure 14, the movement of the current-carrying conductor will inevitably cause a change in magnetic flux within the closed loop consisting of the current-carrying conductor. This implies that in the process of making a current-carrying conductor to experience a force in a magnetic field, the magnetic flux within the closed loop consisting of the current-carrying conductor must be changed. However, the issue that the magnetic flux within the closed loop consisting of the current-carrying conductor must be changed indicates that in order to make the current-carrying conductor to experience a force in a magnetic field, there must be a closed loop consisting of the current-carrying conductor involved and there must be a change in magnetic flux within the closed loop. This implies that the so-called Ampère force apparently generated by a current-carrying conductor in a magnetic field is actually not generated by the current-carrying conductor itself, but it is generated by a closed loop consisting of the current-carrying conductor with a change in magnetic flux within the closed loop. This is because that it is a common logic that if the whole must be involved in the process of achieving an event X, then the event X is achieved by the whole, but not by part of the whole, and any part of the whole does not possess any possibility to achieve the event X. In this case, the closed loop consisting of the current-carrying conductor is the whole, while the current-carrying conductor is part of the whole.

In fact, the Ampère force law, as illustrated in the upper part of Figure 14, includes at least three scenarios. They are: the scenario where the movement of the current-carrying conductor driven by the so-called Ampère force leads to a change in magnetic flux within the closed loop consisting of the current-carrying conductor, and the scenario where the movement of the current-carrying conductor driven by the so-called Ampère force does not lead to a change in magnetic flux within the closed loop consisting of the current-carrying conductor, even if he current-carrying conductor moves, as well as the scenario where there is no closed loop exists at all. As illustrate in the upper part of Figure 15, the scenario where the movement of the current-carrying conductor driven by the so-called Ampère force does lead to a change in magnetic flux within the closed loop consisting of the current-carrying conductor is an example of the so-called Ampère force law, and the scenario where the movement of the current-carrying conductor driven by the so-called Ampère force does not lead to a change in magnetic flux within the closed loop consisting of the current-carrying conductor, even if the current-carrying conductor moves, is absolutely the counterexample to the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field , since if there is no change in magnetic flux within the closed loop consisting of the current-carrying conductor, there must be no the so-called Ampère force. This is because that the change in magnetic flux within the closed loop consisting of the current-carrying conductor is the concomitant of the so-called Ampère force, as illustrated in the lower part of Figure 14 and the lower part of Figure 15. It is a logical truth that if X is the concomitant of Y, both achieved in the same process, then if there is no X, there must be no Y, and vice versa. Within this scenario, there must be no the so-called Ampère force, and there must be no the movement of the current-carrying conductor. Again, as illustrated in the upper part of Figure 15, the scenario where there is no closed loop exists is also absolutely the counterexample to the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field, since if there is no closed loop exists, how there can be a change in magnetic flux within the closed loop consisting of the current-carrying conductor, which is the indispensable prerequisite to generate the so-called Ampère force.

In other words, the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field, as illustrated in the upper part of Figure 14, includes the counterexamples to itself. However, this does not imply that this Ampère force law does not hold true in some cases, but holds true in some other cases. In fact, this indicates that this Ampère force law does not hold true in any cases, that is, the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field does not hold true under any circumstance. These are the logic issues that make the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field to be false. It can be concluded that the so-called Ampère force is actually not generated by the current-carrying conductor itself, but is generated by a closed loop consisting of the current-carrying conductor with a change in magnetic flux within the closed loop. This indicates that the whole of a closed loop is the minimum physical unit required to generate the so-called Ampère force. That is, the closed loop consisting of the current-carrying conductor is the minimum physical unit required to make a current-carrying conductor to experience a force in a magnetic field, but the current-carrying conductor cannot make itself to experience a force in a magnetic field. As the conclusion of all above, the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field has logic defect in its construction process, it does not have logic foundations and is logically untenable, therefore, it cannot hold true.

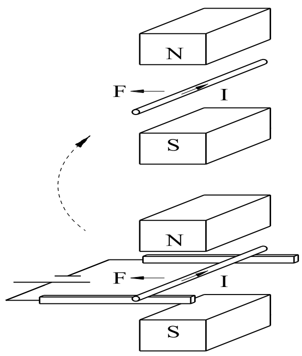

Figure 14: A schematic illustration of Logical experiments on the law construction processes to test the validity of the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field.

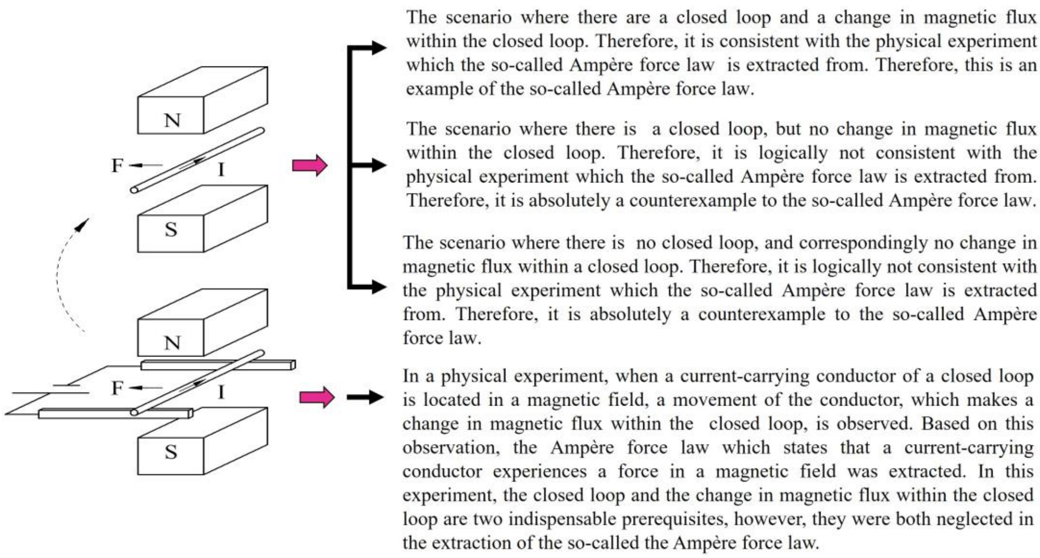

Figure 15: A schematic illustration of Logical experiments on the law construction processes to test the validity of the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field, which clarifies that the so-called Ampère force law actually contains at least two counterexamples to itself.

That is, as illustrated in Figure 15, in a physical experiment, when a current-carrying conductor of a closed loop is located in a magnetic field, a movement of the conductor, which makes a change in magnetic flux within the closed loop, is observed. Based on this observation, the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field was extracted. In this experiment, the closed loop and the change in magnetic flux within the closed loop are two indispensable prerequisites, however, they were both neglected in the extraction of the so-called the Ampère force law. Just because this, the so-called Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field contains three scenarios:

The scenario 1 where there are a closed loop and a change in magnetic flux within the closed loop. Therefore, it is consistent with the physical experiment which the so-called Ampère force law is extracted from. Therefore, this is an example of the so-called Ampère force law.

The scenario 2 where there is a closed loop, but no change in magnetic flux within the closed loop. Therefore, it is logically not consistent with the physical experiment which the so-called Ampère force law is extracted from. Therefore, it is absolutely a counterexample to the so-called Ampère force law.

The scenario 3 where there is no closed loop, and correspondingly no change in magnetic flux within a closed loop. Therefore, it is logically not consistent with the physical experiment which the so-called Ampère force law is extracted from. Therefore, it is absolutely a counterexample to the so-called Ampère force law.

Therefore, the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field has logic defect in its construction process, includes the counterexamples to itself, it does not have logic foundations and is logically untenable, therefore, it cannot hold true.

4.2. Logical experiments to test whether the Faraday's law of motional electromotive force has logic defects in its construction processes

In a physical experiment as illustrated in the lower part of Figure 16, it was observed that a closed loop's conductor which moves and cuts through magnetic field lines generates electric current. Based on this observation, electromagnetic scientists extracted the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force, as illustrated in the upper part of Figure 16. This electromotive force is calculated by $E=BLV\sin\beta$, where, V is the velocity of the conductor, L is the length of the conductor, B is the magnetic induction intensity, sin is the sine function, and β is the angle between the direction of the conductor's movement and the direction of the magnetic field. However, in the physical experiment as illustrated in the lower part of Figure 16, the movement of the conductor cutting through magnetic field lines in generating the motional electromotive force inevitably leads to a change in magnetic flux within the closed loop consisting of the conductor cutting through magnetic field lines. This implies that in this process, the magnetic flux within the closed loop consisting of the conductor cutting through magnetic field lines must be changed. However, the issue that the magnetic flux within the closed loop consisting of the conductor cutting through magnetic field lines must be changed indicates that in order to enable a conductor cutting through magnetic field lines to generate a motional electromotive force, there must be a closed loop consisting of the conductor cutting through magnetic field lines and a change in magnetic flux within the closed loop involved. This indicates that the motional electromotive force is actually not generated by the conductor cutting through magnetic field lines itself, but it is generated by a closed loop consisting of the conductor cutting through magnetic field lines with a change in magnetic flux within the closed loop. As stated above, this is because that it is a common logic that if the whole must be involved in achieving an event X, then the event X is achieved by the whole, but not by part of the whole, and any part of the whole does not possess any possibility to achieve the event X. In this case, the closed loop consisting of the conductor cutting through magnetic field lines is the whole, and the conductor cutting through magnetic field lines is part of the whole.

In fact, within the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force as illustrated in the upper part of Figure 16, there are at least three scenarios. They are: the scenario where the movement of the conductor cutting through magnetic field lines leads to a change in magnetic flux within the closed loop consisting of the conductor, and the scenario where the movement of the conductor cutting through magnetic field lines does not lead to a change in magnetic flux within the closed loop consisting of the conductor cutting through magnetic field lines, as well as the scenario where there is no closed loop exists at all. As illustrate in the upper part of Figure 17, the scenario where the movement of the conductor cutting through magnetic field lines does lead to a change in magnetic flux within the closed loop consisting of the conductor cutting through magnetic field lines is an example of the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force, and the scenario where the movement of the conductor cutting through magnetic field lines does not lead to a change in magnetic flux within the closed loop consisting of the conductor cutting through magnetic field lines is absolutely the counterexample to the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force, since if there is no change in magnetic flux within the closed loop consisting of the conductor cutting through magnetic field lines, there must be no the electromotive force generated. This is because that the change in magnetic flux within the closed loop consisting of the conductor cutting through magnetic field lines is the concomitant of the electromotive force generated, as illustrated in the lower part of Figure 16 and the lower part of Figure 16. Since it is a logical truth that if X is the concomitant of Y, both achieved in the same process, then if there is no X, there must be no Y, and vice versa. Within this scenario, there must be no the so-called electromotive force generated. Again, as illustrated in the upper part of Figure 17, the scenario where there is no closed loop exists is also absolutely the counterexample to the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force, since if there is no closed loop exists, how there can be a change in magnetic flux within the closed loop consisting of the conductor cutting through magnetic field lines, which is the indispensable prerequisite to generate the so-called electromotive force.

In other words, the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force, as illustrated in the upper part of Figure 16, includes the counterexamples to itself. However, this does not imply that the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force as illustrated in the upper part of Figure 16 does not hold true in some cases, but holds true in some other cases. In fact, this indicates that this Faraday's law of motional electromotive force does not hold true in all and any cases. That is, this indicates that the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force does not hold true under any circumstance. These are the logic issues that make the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force to be false. In fact, the conductor cutting through magnetic field lines cannot make itself to generate an electromotive force. Therefore, the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates electromotive force has logic defects in its construction processes, it does not have logic foundations and is logically untenable, therefore, it cannot hold true.

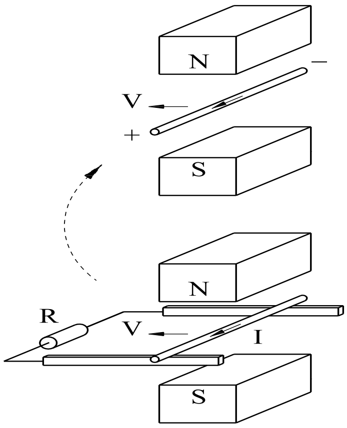

Figure 16: A schematic illustration of Logical experiments on the law construction processes to test the validity of the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force.

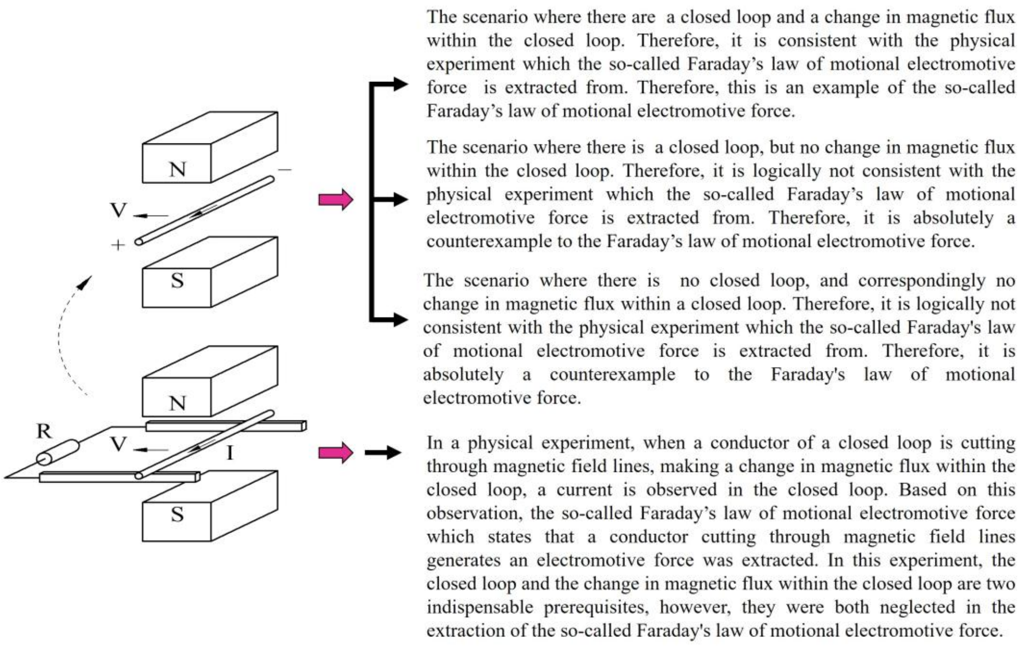

Figure 17: A schematic illustration of Logical experiments on the law construction processes to test the validity of the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force, which clarifies that the so-called Faraday's law of motional electromotive force actually contains at least two counterexamples to itself.

That is, as illustrated in Figure 17, in a physical experiment, when a conductor of a closed loop is cutting through magnetic field lines, making a change in magnetic flux within the closed loop, a current is observed in the closed loop. Based on this observation, the so-called Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force was extracted. In this experiment, the closed loop and the change in magnetic flux within the closed loop are two indispensable prerequisites, however, they were both neglected in the extraction of the so-called Faraday's law of motional electromotive force. Just because this， the so-called

Faraday’s law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force contains three scenarios:

The scenario 1 where there are a closed loop and a change in magnetic flux within the closed loop. Therefore, it is consistent with the physical experiment which the so-called Faraday’s law of motional electromotive force is extracted from. Therefore, this is an example of the so-called Faraday’s law of motional electromotive force.

The scenario 2 where there is a closed loop, but no change in magnetic flux within the closed loop. Therefore, it is logically not consistent with the physical experiment which the so-called Faraday’s law of motional electromotive force is extracted from. Therefore, it is absolutely a counterexample to the Faraday’s law of motional electromotive force.

The scenario 3 where there is no closed loop, and correspondingly no change in magnetic flux within a closed loop. Therefore, it is logically not consistent with the physical experiment which the so-called Faraday's law of motional electromotive force is extracted from. Therefore, it is absolutely a counterexample to the Faraday's law of motional electromotive force.

Therefore, the Faraday’s law of motional electromotive force which states that a conductor cutting through magnetic field lines generates electromotive force has logic defects in its construction processes, includes the counterexamples to itself, it does not have logic foundations and is logically untenable, therefore, it cannot hold true.

4.3. Logical experiments to test whether the Oersted’s law of electromagnetism has logic defects in its construction processes

In a physical experiment as illustrated in the lower part of Figure 18, it was observed that a closed loop’s current-carrying conductor caused a magnetic needle to deflect. Based on this observation, electromagnetic scientists extracted the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor, as illustrated in the upper part of Figure 18. However, in the physical experiment as illustrated in the lower part of Figure 18, in order to make a current-carrying conductor to looks like generating a circular magnetic field, the closed loop consisting of the current-carrying conductor must be loaded a current and with a change in magnetic flux in the closed loop. This implies that in this process, the magnetic flux within the closed loop consisting of the current-carrying conductor must be changed. However, the issue that the magnetic flux within the closed loop consisting of the current-carrying conductor must be changed indicates that in order to enable the current-carrying conductor to generate a circular magnetic field surrounding itself, there must be a closed loop consisting of the current-carrying conductor and a change in magnetic flux in the closed loop involved. This indicates that the circular magnetic field surrounding a current-carrying conductor is actually not generated by the current-carrying conductor itself, but it is generated by a closed loop consisting of the current-carrying conductor with a change in magnetic flux in the closed loop. This is also because that it is a common logic that if the whole must be involved in the process of achieving an event X, then the event X is achieved by the whole, but not by part of the whole, and any part of the whole does not possess any possibility to achieve the event X. In this case, the closed loop consisting of the current-carrying conductor is the whole, and the current-carrying conductor is part of the whole.

In fact, the Oersted's law of electromagnetism, as illustrated in the upper part of Figure 18, includes at least three scenarios. They are: the scenario where the current-carrying conductor generating a circular magnetic field surrounding the conductor leads to a change in magnetic flux in the closed loop consisting of the current-carrying conductor, and the scenario where the current-carrying conductor generating a circular magnetic field surrounding the conductor does not lead to a change in magnetic flux in the closed loop consisting of the current-carrying conductor, as well as the scenario where there is no closed loop exists at all. As illustrated in the upper part of Figure 19, the scenario where the current-carrying conductor generating a circular magnetic field surrounding the conductor does lead to a change in magnetic flux in the closed loop consisting of the current-carrying conductor is an example of the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor, and the scenario where the current-carrying conductor generating a circular magnetic field surrounding the conductor does not lead to a change in magnetic flux in the closed loop consisting of the current-carrying conductor is absolutely the counterexample to the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor, since if there is no change in magnetic flux within the closed loop consisting of the current-carrying conductor, there must be no the circular magnetic field surrounding the conductor generated. This is because that the change in magnetic flux within the closed loop consisting of the current-carrying conductor is the concomitant of the circular magnetic field surrounding the conductor generated, as illustrated in the lower part of Figure 18 and the lower part of Figure 19. It is a logical truth that if X is the concomitant of Y, both achieved in the same process, then if there is no X, there must be no Y, and vice versa. Within this scenario, there must be no the so-called circular magnetic field surrounding the conductor generated. Again, as illustrated in the upper part of Figure 19, the scenario where there is no closed loop exists is also absolutely the counterexample to the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor, since if there is no closed loop exists, how there can be a change in magnetic flux within the closed loop consisting of the current-carrying conductor, which is the indispensable prerequisite to generate the so-called circular magnetic field surrounding the conductor.

In other words, the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor, as illustrated in the upper part of Figure 19, includes the counterexamples to itself. However, this does not imply that this Oersted's law of electromagnetism does not hold true in some cases, but holds true in some other cases. In fact, this indicates that this Oersted's law of electromagnetism does not hold true in any cases. That is, this indicates that the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor does not hold true under any circumstance. These are the logic issues that make the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor to be false. It is concluded that the circular magnetic field surrounding the current-carrying conductor is actually not generated by the current-carrying conductor itself, but is generated by a closed loop consisting of a current-carrying conductor with a change in magnetic flux in the closed loop. The closed loop consisting of a current-carrying conductor is the minimum physical unit required to generate a circular magnetic field surrounding a current-carrying conductor, but the current-carrying conductor itself cannot generate a circular magnetic field surrounding itself. Therefore, the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor has logic defect in its construction processes, it does not have logic foundations and is logically untenable, therefore, it cannot hold true. And correspondingly, the Biot-Savart law has also been disproven, too.

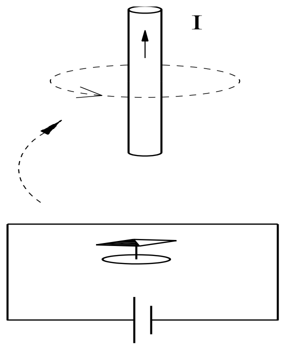

Figure 18: A schematic illustration of Logical experiments on the law construction processes to test the validity of the Oersted's Law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor.

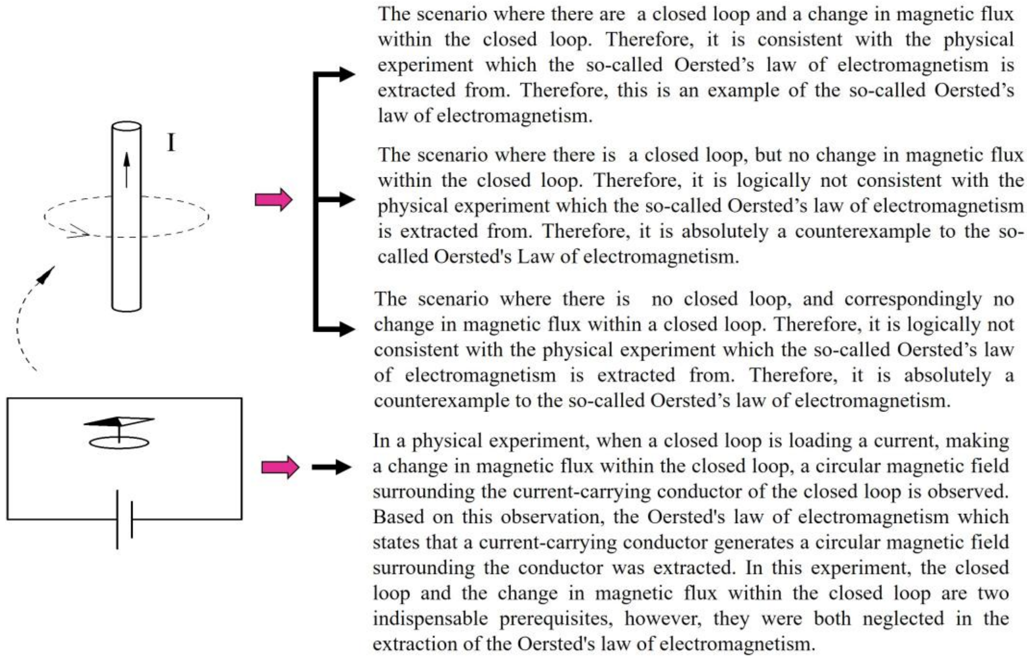

Figure 19: A schematic illustration of Logical experiments on the law construction processes to test the validity of the Oersted's Law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor, which clarifies that the so-called Oersted's Law of electromagnetism actually contains at least two counterexamples to itself.

That is, as illustrated in Figure 19, in a physical experiment, when a closed loop is loading a current, making a change in magnetic flux within the closed loop, a circular magnetic field surrounding the current-carrying conductor of the closed loop is observed. Based on this observation, the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor was extracted. In this experiment, the closed loop and the change in magnetic flux within the closed loop are two indispensable prerequisites, however, they were both neglected in the extraction of the Oersted's law of electromagnetism. Therefore, the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor contains three scenarios:

The scenario 1 where there are a closed loop and a change in magnetic flux within the closed loop. Therefore, it is consistent with the physical experiment which the so-called Oersted’s law of electromagnetism is extracted from. Therefore, this is an example of the so-called Oersted’s law of electromagnetism.

The scenario 2 where there is a closed loop, but no change in magnetic flux within the closed loop. Therefore, it is logically not consistent with the physical experiment which the so-called Oersted's law of electromagnetism is extracted from. Therefore, it is absolutely a counterexample to the so-called Oersted's Law of electromagnetism.

The scenario 3 where there is no closed loop, and correspondingly no change in magnetic flux within a closed loop. Therefore, it is logically not consistent with the physical experiment which the so-called Oersted's law of electromagnetism is extracted from. Therefore, it is absolutely a counterexample to the so-called Oersted's law of electromagnetism.

Therefore, the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field surrounding the conductor has logic defects in its construction processes, includes the counterexamples to itself, it does not have logic foundations and is logically untenable, therefore, it cannot hold true.

4.4. Logical experiments to test whether the Lorentz force law has logic defects in its construction processes

In a physical experiment as illustrated in the lower part of Figure 20, it was observed that an independent moving charge of a closed loop consisting of the flow (that is, the current) of the independent moving charge experiences a force and curves when the independent moving charge is placed in a magnetic field. Here, the closed loop does not have to be a conductor closed loop, and can be a closed loop consisting of displacement currents and the flow of an independent moving charge. Based on this observation, electromagnetic scientists extracted the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field as illustrated in the upper part of Figure 20. This force is termed as the Lorentz force and this Lorentz force is considered to be $F = qvB\sin\beta$, where q is quantity of the charge, v is the velocity of the charge, B is the magnetic induction intensity, sin is the sine function, and β is the angle between the moving direction of charge and the magnetic field direction. However, in the physical experiment illustrated in the lower part of Figure 20, the curving motion of the charge would inevitably cause a change in magnetic flux within the closed loop consisting of the flow of the independent moving charge. This indicates that in this process, the magnetic flux within the closed loop consisting of the flow of an independent moving charge must be changed. However, the issue that the magnetic flux within the closed loop consisting of the flow of the independent moving charge must be changed indicates that in order to enable the independent moving charge to experience a force in a magnetic field, there must be a closed loop consisting of the flow of the independent moving charge and a change in magnetic flux within the closed loop involved. This indicates that the so-called Lorentz force apparently generated by the independent moving charge in a magnetic field is actually not generated by the independent moving charge itself, but generated by the closed loop consisting of the flow of the independent moving charge. This is because that it is a common logic that if the whole must be involved in achieving an event X, then the event X is achieved by the whole, but not by part of the whole, and any part of the whole does not possess any possibility to achieve the event X. In this case, the closed loop consisting of the flow of the independent moving charge is the whole, and the flow of the independent moving charge is part of the whole.

In fact, the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field, as illustrated in the upper part of Figure 20, includes at least three scenarios. They are: the scenario where the curving of the trajectory of the independent moving charge driven by the so-called Lorentz force leads to a change in magnetic flux within the closed loop consisting of the flow of the independent moving charge, and the scenario where the curving of the trajectory of the independent moving charge driven by the so-called Lorentz force does not lead to a change in magnetic flux within the closed loop consisting of the flow of the independent moving charge, even if the trajectory of the independent moving charge curves, as well as the scenario where there is no closed loop exists at all. As illustrate in the upper part of Figure 21, the scenario where the curving of the trajectory of the independent moving charge driven by the so-called Lorentz force does lead to a change in magnetic flux within the closed loop consisting of the flow of the independent moving charge is an example of the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field, and the scenario where the curving of the trajectory of the independent moving charge driven by the so-called Lorentz force does not lead to a change in magnetic flux within the closed loop consisting of the flow of the independent moving charge, even if the trajectory of the independent moving charge curves, is absolutely the counterexample to the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field, since if there is no change in magnetic flux within the closed loop consisting of the flow of the independent moving charge, there must be no the so-called Lorentz force. This is because that the change in magnetic flux within the closed loop consisting of the flow of the independent moving charge is the concomitant of the so-called Lorentz force, as illustrated in the lower part of Figure 20and the lower part of Figure 21. It is a logical truth that if X is the concomitant of Y, both achieved in the same process, then if there is no X, there must be no Y, and vice versa. Within this scenario, there must be no the so-called Lorentz force, and there must be no the curving of the trajectory due to the so-called Lorentz force. Again, as illustrated in the upper part of Figure 21, the scenario where there is no closed loop exists is also absolutely the counterexample to the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field. Since if there is no closed loop exists, how there can be a change in magnetic flux within the closed loop consisting of the flow of the independent moving charge, which is indispensable prerequisite to achieve the so-called Lorentz force.

In other words, the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field, as illustrated in the upper part of Figure 20, includes the counterexamples of itself. However, this does not imply that the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field, as illustrated in the upper part of Figure 20, does not hold true in some cases, but holds true in some other cases. In fact, this indicates that this Lorentz force law does not hold true in any cases. That is, this indicates that the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field does not hold true under any circumstance. These are the logic issues that make the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field to be false. It is concluded that the so-called Lorentz force is actually not generated by the independent moving charge in a magnetic itself, but is generated by a closed loop consisting of the flow of the independent moving charge in a magnetic field with a change in magnetic flux in the closed loop. The closed loop consisting of the flow of the independent moving charge in a magnetic field is the minimum physical unit required to make an independent moving charge to experience a force in a magnetic field, but not by the independent moving charge moves in a magnetic field itself. The independent moving charge in a magnetic field on its own cannot make itself experience a force in a magnetic field. Therefore, the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field has logic defect in its construction processes, does not have logic foundations and is logically untenable, therefore, it cannot hold true. In this case, it looks like there is no closed loop exists, but actually there are closed loops involved. These closed loops consist of the flow of independent moving charges and the displacement currents, the displacement currents are among the point the charge starts moving from, the route the charge travels along and the point the charge ends up the moving at. They are connected in series within a closed loop, forming the closed loops of electric field.

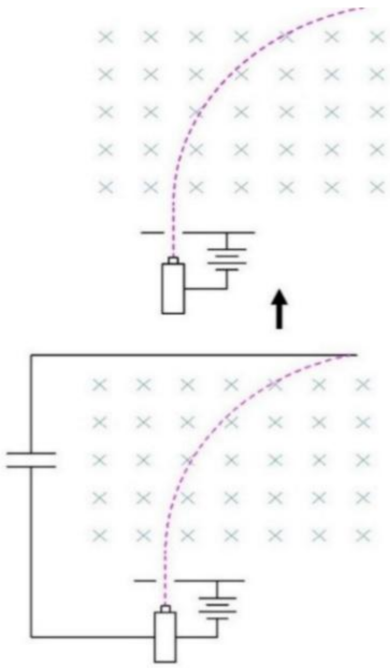

Figure 20: A schematic illustration of Logical experiments on the law construction processes to test the validity of the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field.

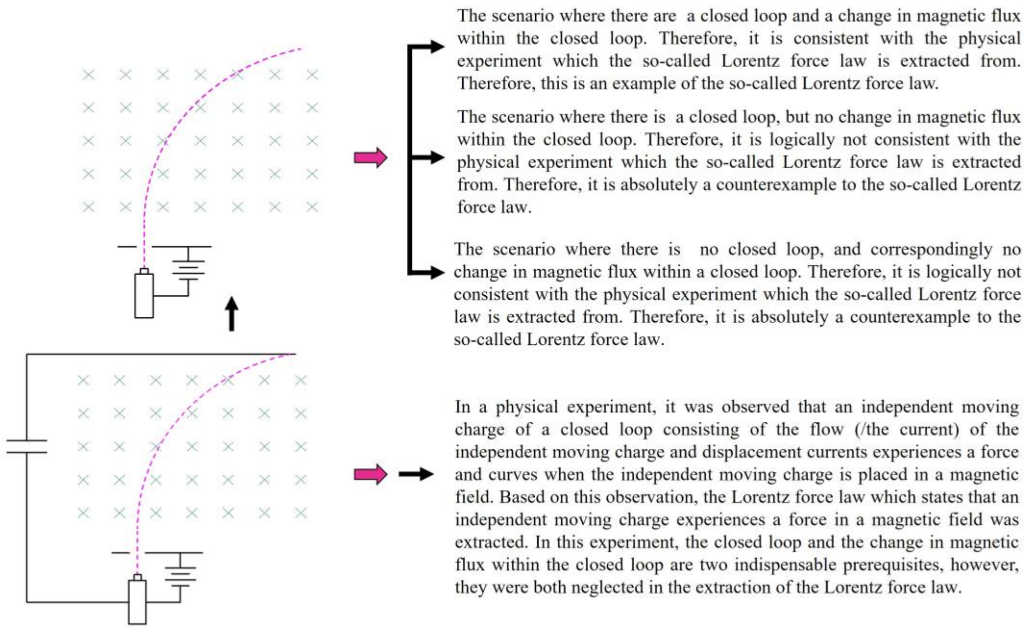

Figure 21: A schematic illustration of Logical experiments on the law construction processes to test the validity of the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field, which clarifies that the so-called Lorentz force law actually contains at least two counterexamples to itself.

That is, as illustrated in Figure 21, in a physical experiment, it was observed that an independent moving charge of a closed loop consisting of the flow (/the current) of the independent moving charge and displacement currents experiences a force and curves when the independent moving charge is placed in a magnetic field. Based on this observation, the so-called Lorentz force law which states that an independent moving charge experiences a force in a magnetic field was extracted. In this experiment, the closed loop and the change in magnetic flux within the closed loop are two indispensable prerequisites, however they were both neglected in the extraction of the Lorentz force law. Just because this, the so-called Lorentz force law which states that an independent moving charge experiences a force in a magnetic field contains three scenarios:

The scenario 1 where there are a closed loop and a change in magnetic flux within the closed loop. Therefore, it is consistent with the physical experiment which the so-called Lorentz force law is extracted from. Therefore, this is an example of the so-called Lorentz force law.

The scenario 2 where there is a closed loop, but no change in magnetic flux within the closed loop. Therefore, it is logically not consistent with the physical experiment which the so-called Lorentz force law is extracted from. Therefore, it is absolutely a counterexample to the so-called Lorentz force law.

The scenario 3 where there is no closed loop, and correspondingly no change in magnetic flux within a closed loop. Therefore, it is logically not consistent with the physical experiment which the so-called Lorentz force law is extracted from. Therefore, it is absolutely a counterexample to the so-called Lorentz force law.

Therefore, the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field has logic defects in its construction processes, includes the counterexamples to itself, it does not have logic foundations and is logically untenable, therefore, it cannot hold true.

5. Discussion

Because the physical laws of nature are interrelated systems, no physical law can contradict any other physical laws. Therefore, if physical law A contradicts physical law B, then at least, one of these two physical laws does not hold true. In this research, it is discovered that the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field, the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force, the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field, and the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field all violate the law of causality, all violate the law of conservation of energy, therefore, these four fundamental laws of electromagnetism have no way to hold true, since the law of causality and the law of conservation of energy do hold true.

In addition, it is logical that if any physical law has logic defects in its construction processes, this physical law will not hold true. In this research, it is discovered the Ampère force law, the Faraday's law of motional electromotive force, the Oersted's law of electromagnetism, and the Lorentz force law all have logic defects, therefore none of them hold true.

6. Conclusions

With the results obtained in this research, it is concluded that the Ampère force law which states that a current-carrying conductor experiences a force in a magnetic field, the Faraday's law of motional electromotive force which states that a conductor cutting through magnetic field lines generates an electromotive force, the Oersted's law of electromagnetism which states that a current-carrying conductor generates a circular magnetic field, and the Lorentz force law which states that an independent moving charge experiences a force in a magnetic field all violate the law of causality, all violate the law of conservation of energy, and all have logic defect in their construction processes. Therefore, none of these four fundamental laws of electromagnetism hold true, all of them are logically untenable. Correspondingly, the Biot-Savart law of electromagnetism does not hold true either, it is also logically untenable, too. The results indicate that the whole of a closed loop is the minimum physical unit required to generate an electromagnetic phenomenon, any part of this minimum physical unit is incapable of achieving any electromagnetic phenomenon. The whole of a closed loop with a change in magnetic flux within the closed loop is the necessary and sufficient condition for achieving electromagnetic phenomenon, and none of conductor segment Δl, differential segment dl, current elements Idl, or independent moving charge can generate any electromagnetic phenomenon on its own. Electromagnetic phenomena, such as the so-called Ampère force, the so-called motional electromotive force, the so-called Oersted's magnetic field and the so-called Lorentz force, are all generated by the whole of a closed loop with a change in magnetic flux (/in magnetic induction intensity) within the closed loop, but not generated as the relevant law states. For the so-called Lorentz force, the closed loop is consisting of the independent moving charge beam and displacement currents, that is the general closed loop.

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Author Declarations

Ethics approval and consent to participate The author declares that this study was conducted in accordance with ethical standards and guidelines.

Consent for publication The author declares that this manuscript does not contain any personal data or sensitive information that requires consent for publication.

Competing interests The author declares that he has no competing interest.

Reference

1. Cheng, David K., Field and Wave Electromagnetics, CIP (2019) 284478

2. Purcell, Edward M. & Morin David J., Electricity and Magnetism, 3rd ed.; Cambridge University Press, 2013.

3. Collin, Robert E., Field Theory of Guided Waves, 2nd ed.; Wiley-IEEE Press, 1990.