

Electric Currents, Magnetic Fields, Magnetic Pulses and Electromagnetic Propulsion

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Abstract

A single circular loop conductor [ring] with its current induces a magnetic field, not only surrounding the ring but also within the substance of the ring. Subsequently, that portion of the magnetic field, which is located within the body of the ring, interacts with its own current to produce Lorentz forces. Electromagnetic propulsive forces are produced from this process. However, these forces are either blocked by the intact structure of the ring, or they are symmetrically oriented in opposing directions. As such, these later forces counteract each other. Essentially, all the forces are balanced; consequently there is no propulsion of the ring. However, if a directed magnetic pulse [magnetic flux compression producer -EMP] distorts the magnetic field relative to one side of the plane of the ring, then for the duration of this pulse, there will be within the ring some Lorentz forces that are neither blocked by its physical structure nor annulled by opposing symmetrical forces. Accordingly, these forces are unbalanced. As a result, there will be electromagnetic propulsion of the ring along its axis.

Introduction

The intention of this article is to posit a theory of electromagnetic propulsion based upon an electric current, a magnetic field, as well as directed magnetic pulses [EMP]. It is fundamentally a very simple concept based upon these three assumptions

- A current within a wire conductor induces a magnetic field not only surrounding the wire, but within the substance of the wire as well.
- Subsequently that portion of the magnetic field which is located **within the wire** interacts with its own current, again **within the wire** to produce Lorentz forces, once more **within the wire**
- By means of magnetic flux compression technology, one can project a powerful magnetic pulse in a specific direction, analogous to a gun [EMP].

Subsequently, these three assumptions will be used to assemble a hypothetical electromagnetic propulsion device. Due to the complex three-dimensional nature of this concept, it is considerably easier to explain this model if one uses

diagrams. For that reason six diagrams will be presented. Each diagram will present a concept that will lead to the next diagram, until finally the concept of electromagnetic propulsion is explained. The six diagrams are listed as below.

1. A single straight wire conductor with a current
2. Two straight wire conductors with their currents flowing in the same direction
3. Two straight wire conductors with their currents flowing in opposite directions
4. A single circular wire conductor [ring] with a current
5. Two circular wire conductors [rings] with both of their currents flowing in the same direction
6. A single circular [loop] conductor [ring] with a current, along with its induced magnetic field. The latter of which is distorted on one side, relative to the plane of the ring, by a directed magnetic pulse. As a result there is electromagnetic propulsion.

Diagram 1 The current within the wire conductor induces a magnetic field. Subsequently, that portion of the magnetic field located within the substance of wire then interacts with its own current to produce the Lorentz Forces as depicted.

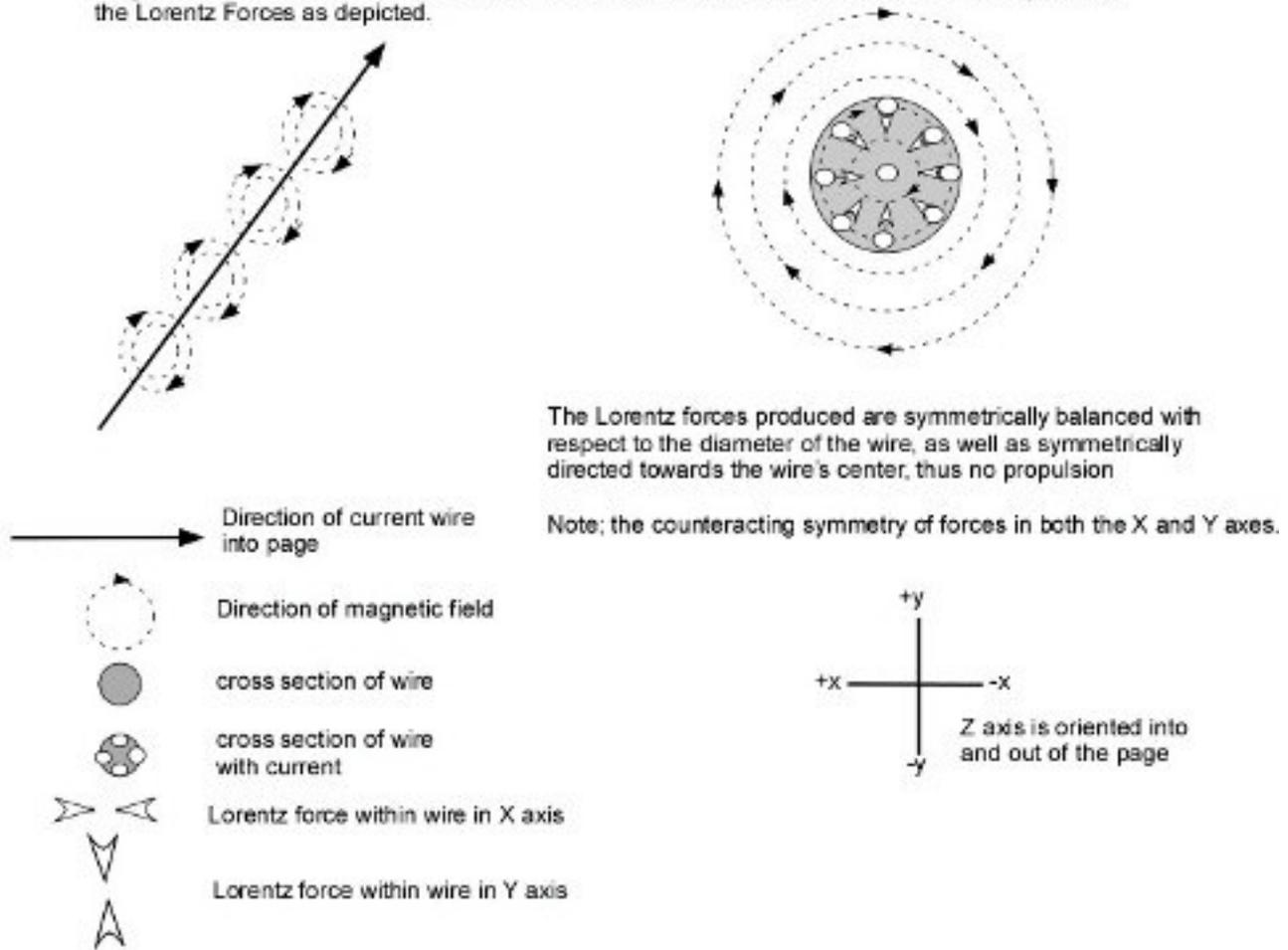


Diagram 1

Diagram 1 illustrates a single straight wire conductor, with its current flowing into the page. The wire with its current induces a circular magnetic field, not only surrounding the wire, but also within its own substance. Subsequently, that portion of the magnetic field which is located within the body of the wire interacts with its own current, to produce the Lorentz forces as depicted in diagram 1. Notice; both the density of the magnetic flux, as well as the direction of the Lorentz forces are symmetric with respect to the wire's diameter. Furthermore, the Lorentz forces are oriented symmetrically in a circle towards its center. Electromagnetic propulsive forces are produced by this process; nevertheless due to the above symmetry these forces are balanced. As a consequence there is no motion. On the other hand, if these

forces were somehow asymmetrical rather than symmetrical, there would be propulsion. Nonetheless, this is not the case.

In this and subsequent diagrams, the overall Lorentz forces will be divided into separate vector forces within the X [+x,-x] and Y [+y,-y] axes, and additionally in the Z axis, with respect to the later illustrations. For example, in this diagram the Lorentz forces counteract each other in both the X and Y axes. However, in reality all the Lorentz forces are oriented symmetrically in a pattern of a circle towards the wire's center. As such, they again neutralize each other. In both instances, there is no propulsion as these forces are balanced. In essence, the two scenarios are analogous to each other. I have chosen this method of explanation, so one can easily envision the concepts. Otherwise the diagrams and description will be too complex to comprehend.

Diagram 2

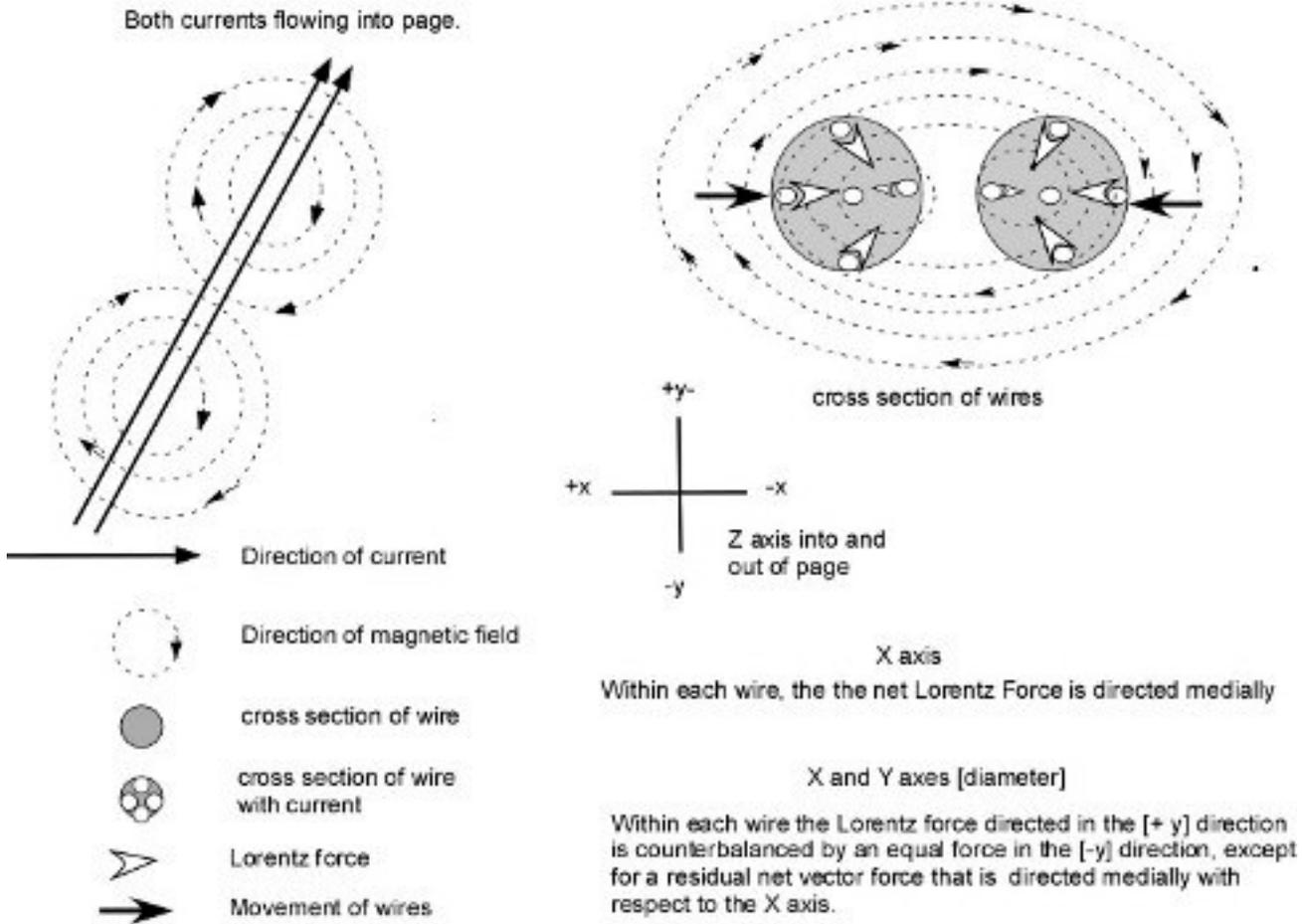


Diagram 2

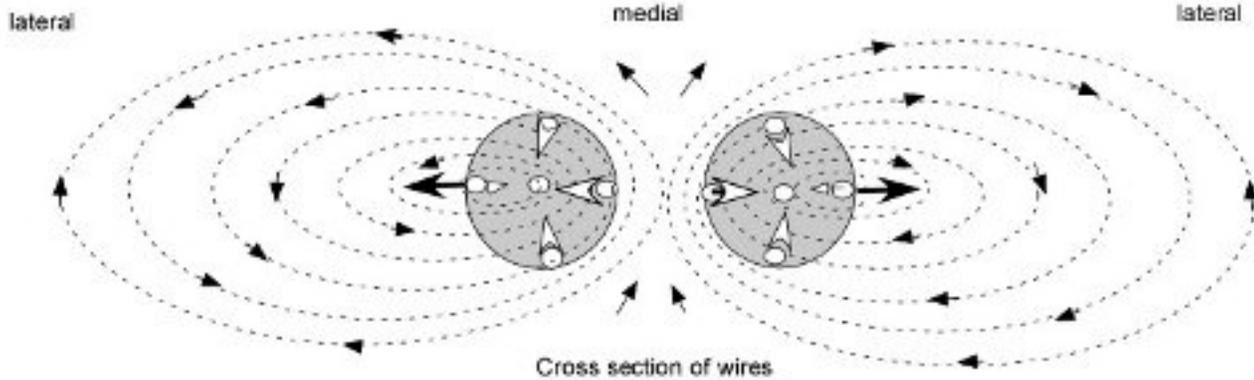
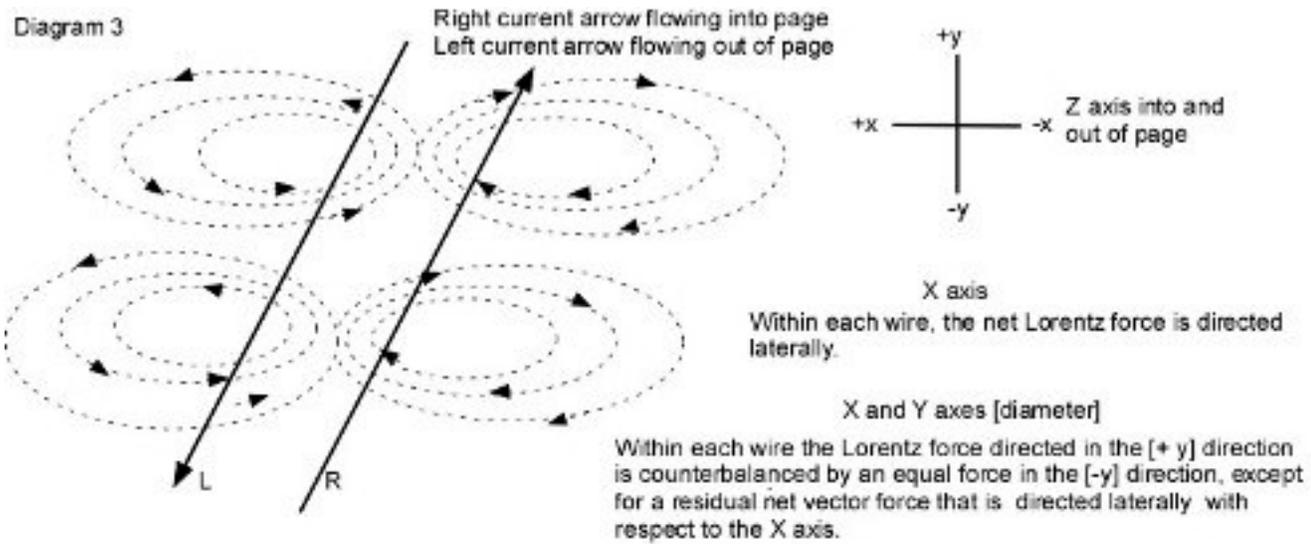
Diagram 2 illustrates two straight wire conductors with both currents flowing into the page. Each separate wire with its current induces its own magnetic field, not merely surrounding its own wire, but also within the substance of its own wire. As depicted in diagram 2, the two magnetic fields interact to create one overall modified field. Subsequently, that portion of this modified field which is located within the body of each wire interacts with the current in that same wire to produce the Lorentz forces as illustrated. Notice with respect to each wire, the density of the magnetic flux in the X axis [+x versus -x directions] is asymmetrical, furthermore greater laterally compared to medially. Therefore, the Lorentz force that is directed medially is greater compared to the force which is directed laterally. Observe as well,

relative to each wire, that the density of the magnetic flux takes the form of a mirror image symmetrical pattern, in the X and Y axes [diameter], relative the X axis. Therefore, the resulting Lorentz forces neutralize one another, except for a residual vector directed medially.

Consequently, with respect to each wire, the direction of the **net** Lorentz force is medial, as a result, the wires propel towards each other. This process is actually electromagnetic propulsion, nevertheless impractical, given that once the wires are in contact, all motion ceases. Make a note of; outside the substance of the wires in the region of the interacting magnetic fields, there is no force. Forces are located only within the body of the wires, where the one modified magnetic field interacts with each of the two currents.

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Diagram 3



Symbols are the same as prior diagrams

Diagram 3

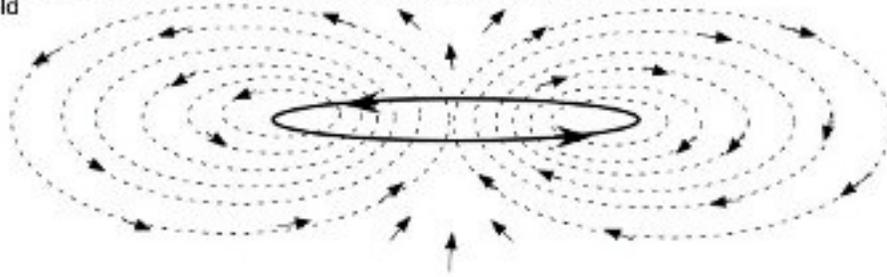
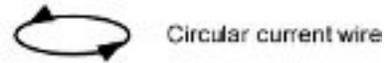
Diagram 3 illustrates two straight wire conductors with opposing currents. The left current is flowing out of the page, whereas the right current is flowing into the page. Each wire with its current induces its own magnetic field, not only surrounding itself, but also within its own substance as well. The two magnetic fields interact and form two separate modified fields, as depicted in diagram 3. Subsequently, that portion of each modified field which is located within the body of its own wire interacts with its own current to produce the Lorentz forces as illustrated. Notice relative to each wire, the density of the magnetic flux in the X axis [+x and -x directions] is asymmetrical, moreover greater medially compared to laterally. Therefore, the Lorentz force that is directed laterally is greater compared to the force which is directed medially. Observe as well, relative to each wire, that the density of the

magnetic flux takes the form of a mirror image symmetrical pattern, in the X and Y axes [diameter] relative to the X axis. Therefore, the Lorentz forces neutralize each other, except for a residual vector directed laterally.

Consequently, with respect to each wire, the direction of the **net** Lorentz force is lateral, as such, the wires propel away from each other. Once again, outside the substance of the wires in the region of the interacting magnetic fields there is no force. Force is located only within the body of each wire, where the current within that wire interacts with its own associated modified magnetic field. This process is electromagnetic propulsion, though impractical, since once the wires travel a given distance from each other, the two magnetic fields will cease to interact. Subsequently each will turn into a single wire as depicted in diagram 1.

Diagram 4

The circular current within the ring induces a symmetrical magnetic field throughout 360 degrees, however this diagram is only a cross section of that field



X and Z axes

The NET Lorentz forces are directed towards the outside of the ring.

Relative to the plane of the ring versus the Y axis

The Lorentz forces counterbalance each other, except for a residual vector directed towards the outer side of the ring.

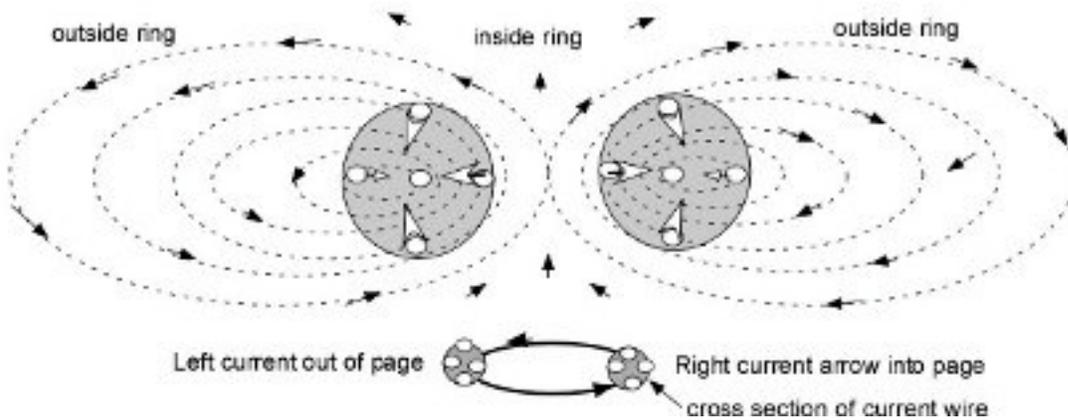
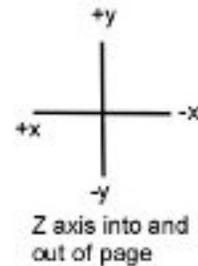
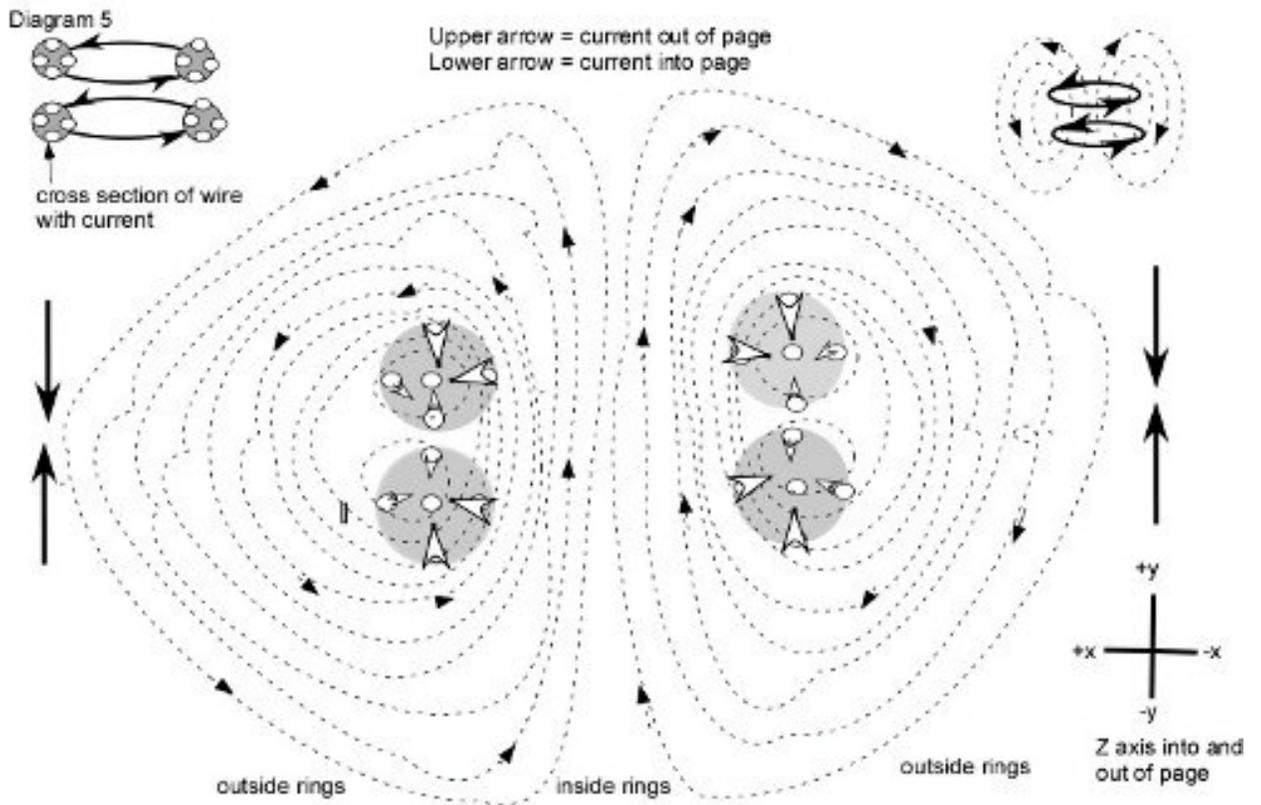


Diagram 4

Diagram 4 illustrates a current in a single circular [loop] conductor. In future deliberations, this structure will be defined as the ring. The shape of the magnetic field created by this current is equivalent to the classical magnetic field induced by a loop current, as depicted in diagram 4. The ring with its current produces a magnetic field not just surrounding itself, but also within its own essence. Subsequently, that portion of the magnetic field which is located within the body of the ring interacts with its own current to produce the Lorentz forces as depicted. Notice; relative to the plane of the ring, the density of the magnetic flux in the body of ring is asymmetrical, moreover greater within the inner side of the ring compared to within its outer side. Therefore, throughout 360 degrees, the Lorentz forces that are directed towards the outside of the ring are greater compared to those forces which are directed towards its inside. Observe as well, relative to the

plane of the ring versus the Y axis, the density of the magnetic flux, within the ring, takes the form a mirror image symmetrical pattern. Therefore, throughout 360 degrees, the Lorentz forces neutralize each other, except for a residual vector, directed towards the outside of the ring. Consequently, with respect to the plane of the ring, the overall net Lorentz forces are directed symmetrically and equally outward, throughout its circumference. Nevertheless, the ring is a physically intact structure, accordingly it resists these forces.

In other words, all the Lorentz forces produced within the ring are either blocked by its solid structure, or else they neutralize one another. As such, there are no unbalanced forces. Consequently, as previously depicted in diagram 1, there is again no propulsion. Alternatively, if the Lorentz forces were somehow asymmetrical with respect to both sides of the plane of the ring, there would be propulsion. Commit this last concept to memory.



Relative to the plane of each ring [X and Z axes], the NET Lorentz forces are directed towards the outer side of the ring, except for a residual vector with respect to the lower ring towards [+y] and the upper ring towards [-y].

Relative to the plane of each ring versus the Y axis the NET Lorentz forces of each ring are towards the other ring.

Diagram 5

Diagram 5 illustrates two parallel ring conductors, oriented in the same axis, with their currents flowing in an identical direction [solenoid]. Each ring with its current induces a classically shaped loop current magnetic field, not only surrounding its own ring, but within its own substance as well. The two magnetic fields interact to form one overall modified field as depicted. Subsequently, that portion of this overall modified field, which is located within the body of each ring, interacts with the current in that same ring. This produces the Lorentz forces as depicted. With respect to the plane of each ring, [X and Z axes], the density of the magnetic flux in that ring is greater within the inner side of the ring compared to within its outer side. Therefore, throughout each circumference, the **net** Lorentz forces are directed symmetrically towards the outside of the ring, — except for a residual vector towards [+y] with respect to the lower ring, and a residual vector towards [-y] with respect to the upper ring. Furthermore, relative to the plane of each ring, versus the Y axis, [throughout the ring] there is now an asymmetry of

the density of the magnetic flux within each ring. On one hand, with regards to the upper ring, the density of the magnetic flux is greater towards the top of the page [+y] compared to the bottom of the page [-y]. On the other hand, with regards to the lower ring, the density of the magnetic flux is greater towards the bottom of the page [-y] compared to the top of the page [+y]. Accordingly, the upper ring's **net** Lorentz forces are directed towards the lower ring [-y]. Conversely the lower ring's **net** forces are directed towards the upper ring [+y].

In other words, all the individual Lorentz forces within each ring either neutralize one another, or else they are blocked by its physical structure, with the exception of those unbalanced forces which propel each ring towards the other ring, with respect to the Y axis. Once again, this is electromagnetic production, nevertheless impractical, given that once the two rings are in contact, then all motion ceases. At that time, together, they will act analogous to a single ring, as illustrated in diagram 4.

Diagram 6

Relative to the plane of the ring, [X and Z axes], the net Lorentz forces are directed towards the outer side of the ring. Relative to the plane of the ring versus the Y axis, the Lorentz forces direction is towards [+y] except for a residual vector directed towards the outer side of the ring.

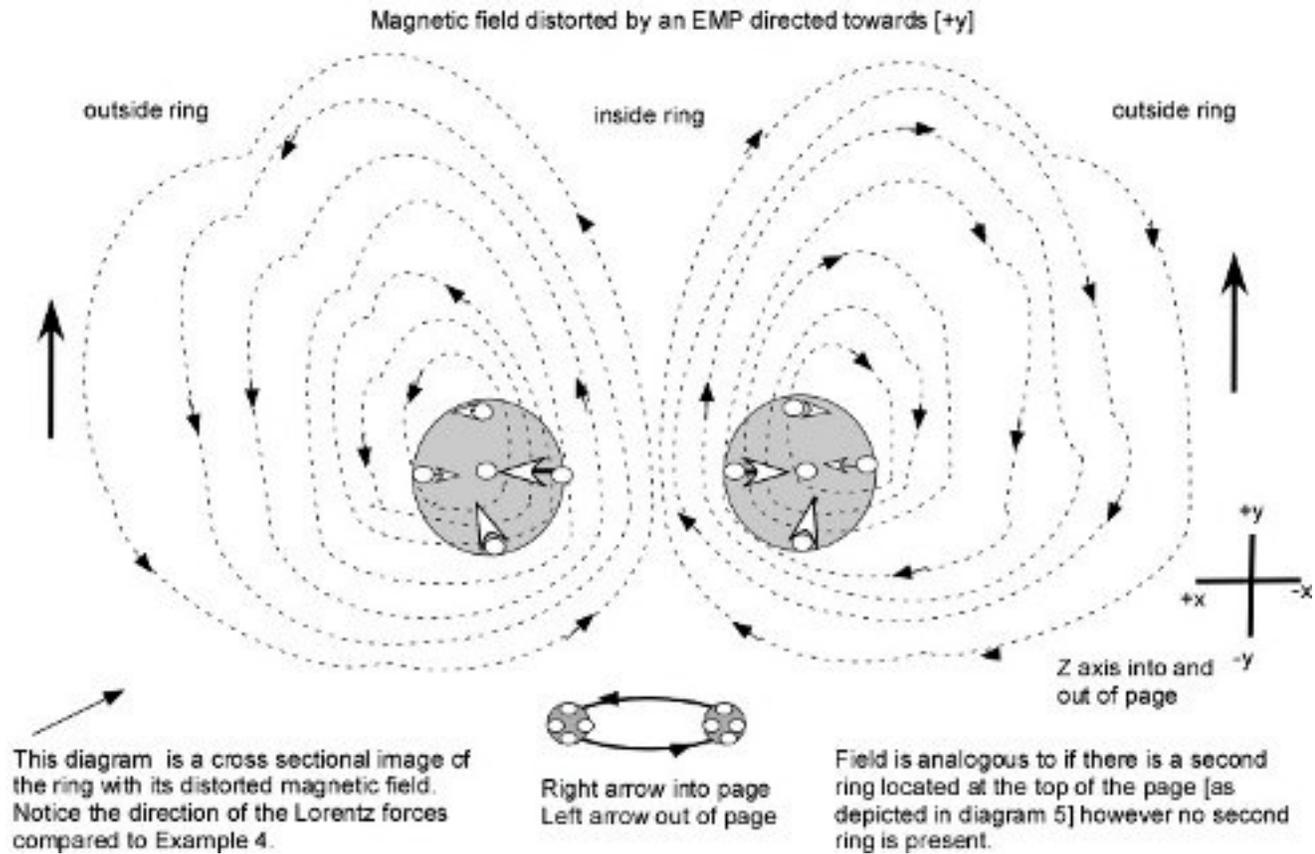


Diagram 6

In order to comprehend this last and crucial diagram, one must appreciate the concept of magnetic flux compression producers [see appendix 1]. This apparatus produces an extremely powerful **directed** magnetic pulse [EMP], which can be used as a military weapon, analogous to a gun. However, in this situation it produces electromagnetic propulsion. Recall in Diagram 4, that relative to the plane of the ring, [X and Z axes], the **net** Lorentz forces are symmetrically directed, throughout its circumference, towards the outside of the ring, Nevertheless, the ring remains intact. As a consequence, there is no propulsion. Recall as well, relative to the plane of the ring, versus the Y axis [throughout the ring], there is mirror image symmetry of the Lorentz forces. As a result they neutralize one another, with the exception of a residual vector, oriented towards the outside of the ring [blocked]. Thus, again there is no propulsion. In summary, with reference to diagram 4, there are electromagnetic propulsive forces produced within the ring, nevertheless they are either blocked by its intact structure, or else they counteract one another. Essentially, there are no unbalanced forces and so no propulsion.

Now imagine that a single uniform magnetic pulse, from a magnetic flux compression producer is emitted from the center

of this ring. Moreover, presume as well this device is attached to the ring. Furthermore, assume the pulse is directed towards one side, relative to the plane of the ring [+y]. Therefore, for an extremely brief period of time, this pulse will distort the shape of the magnetic field on that side. Thus, with respect to the plane of the ring versus the Y axis, the mirror image symmetry previously depicted in diagram 4 is lost, as now illustrated in diagram 6. Observe; relative to the plane of the ring, at this instant in time, there are symmetrical **net** vector forces directed throughout its circumference towards the outside of the ring, which are neutralized by its intact structure. In addition, there are other **net** vector forces directed throughout its circumference towards the top of the page [+y], that are now **not** neutralized. Given that these later forces are unbalanced; with respect to the Y axis, then during each pulse, there will be electromagnetic propulsion towards the top of the page [+y].

In other words, the directed magnetic pulse mimics the magnetic field that was induced by the upper ring as illustrated in diagram 5, even though that ring is nonexistent.

Furthermore, if one assumes a very rapid sequence of EMP's, then each EMP will be associated with a pulse of propulsion. Accordingly, there will be continual motion in the +y direction. I have arbitrarily chosen to expand the magnetic field on the side of the directed magnetic pulse. Alternatively, one could contract the magnetic field on that side as well. If so, the propulsion would be towards the bottom of the page [-y]. See Appendix 3.

In this model the force on the producer related to the production of the EMP is in the opposite direction with respect to the emitted EMP. Notice; the direction of the propulsion of the ring related to the unbalanced Lorentz forces can be in the opposite direction as the force on the producer, or on the other hand in the same direction. These two forces do not necessarily have to counteract one other, nor are they unavoidably equal to each other, conceivably the disparity in magnitude is massive. Furthermore, an explosion within a closed system [box containing the compressor] does not propel.

For simplicity of explanation, I have used the concept of magnetic flux compression producers too freely. In reality, it is an explosive apparatus which self destructs during the production of one extremely powerful directed magnetic pulse. Alternatively, this hypothetical propulsion device requires a non explosive magnetic flux compression producer capable of extremely rapid sequential pulses [See appendix 1].

Conclusion

To reiterate this concept in simpler words, a circular conductor [ring] with its current induces a magnetic field not only surrounding the ring but also within its own essence. Subsequently, that portion of the magnetic field which is located within the body of ring interacts with its own current to produce Lorentz forces. There are electromagnetic propulsive forces produced, within the ring, by this process.

However these forces are either blocked by its intact structure, or else the forces are oriented in opposite directions. Moreover they are symmetrical, therefore they neutralize one another. In essence, all of the Lorentz forces within the ring are balanced. As a consequence, there is no propulsion of the ring.

Alternatively, when the magnetic field on one side of the plane of the ring is symmetrically distorted by a directed magnetic pulse [EMP], then within the ring, there are still Lorentz forces. Nevertheless, in this scenario some of them are not blocked by its intact structure, nor are they neutralized by other symmetrical opposing forces. As a result, these forces are unbalanced. Consequently, during each pulse; there will be electromagnetic propulsion of the ring along its axis.

Now what form would this hypothetical device assume, moreover how would its function appear? First, it would be circular or disk shaped [ring]. Second, it would be associated with a strong magnetic field. Third, on one side, relative to the plane of the disk, it would emit very powerful magnetic pulses. Fourth, it would propel along its axis. Fifth, it would emit electromagnetic radiation, either related to the production of the magnetic pulses or due to the rapidly changing magnetic field. Finally, it could travel anywhere within the space of the universe without a propellant.

It should be obvious to you, that the hypothetical device described in this paper possesses many of the characteristics usually associated with Unidentified Flying Objects. Furthermore, if they truly exist, moreover if there is intelligence behind them, then perhaps those who build them do not manipulate gravity as assumed, but rather they are the absolute masters of electromagnetism.

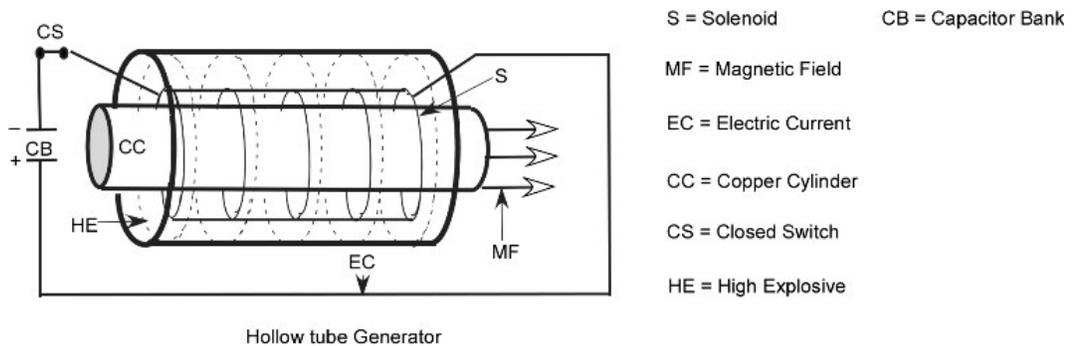
See Appendix 1, 2, and 3 on the following pages

Appendix 1

The next two illustrations describe the physical structure as well as the function of two types of Magnetic Flux Compression Generators. This device is an explosive self destructive apparatus good for only one extremely powerful magnet pulse. I have used this model only to demonstrate the underlying physics of the concept. However, I believe there are other analogous or similar devices which are non-explosive

as well as non-self destructive. Even so they not readily available for review in the literature, given that they are classified. Nevertheless, in order for the device to function appropriately with respect to this concept, it will have to be non-destructive/non-explosive as well as capable of emitting an extremely rapid sequence of directed pulses.

**Illustration 1 [Note the gauss of the emitted directed magnetic field]
Hollow tube generator**



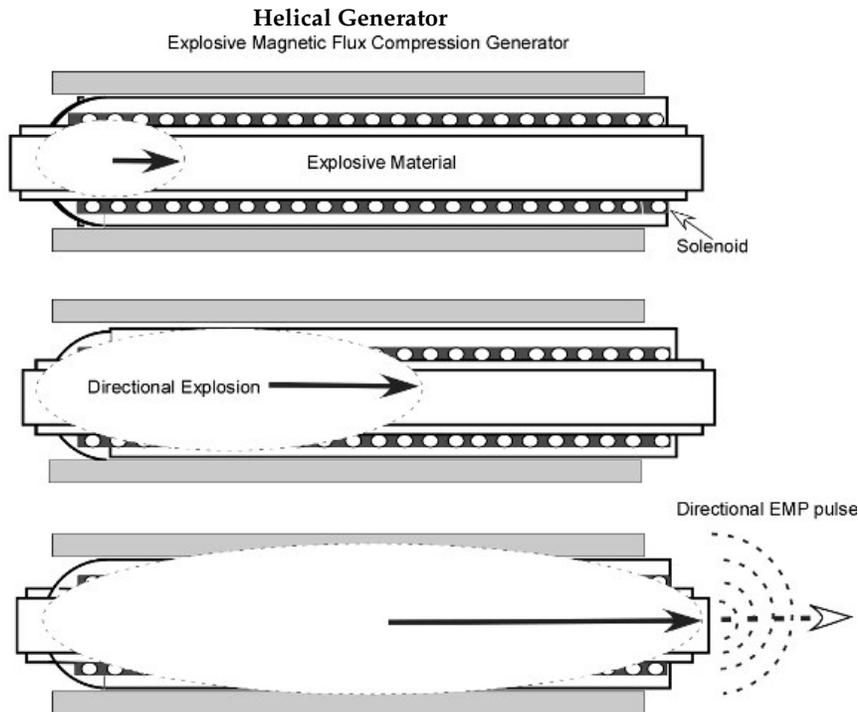
The function of the MK generator is as follows

A longitudinal magnetic field is induced inside a hollow metallic conductor from the discharge of a bank of capacitors into the solenoid which surrounds the cylinder.

The explosive charge which is located around the tube is donated at a time when the current through the solenoid is at a maximum.

The convergent shock wave caused by the implosion causes a rapid contraction of the central cylinder, compressing the magnetic field, and creating a massive increase in the inductive current [hence also a massive increase in the magnetic field] The first experiments were able to obtain magnetic fields of millions of gauss

Illustration 2 [Note the directional nature of the magnetic pulse]



Magnetic Flux Compression Generators were invented by Sakharov and C.M. Fowler. A Flux Compression Generator [Magnetocumulative Generator] is a directed Electromagnetic Pulse [DEMP] gun

Appendix 2

The image shown below depicts a non-magnetic object—a frog being levitated by a strong magnetic field within the center of a solenoid. The magnetic field induced by the solenoid distorts individual atoms [electrons and protons] within the frog causing them to become diamagnetic. As a result, each individual atom of the frog repels the induced magnetic field; consequently the frog levitates. Observe; the frog is accelerating away from the surface of the Earth, yet

there is no compaction [inertia] as the frog is weightless. In the same way, if this apparatus was located in outer space and accelerated at 1 G, again there would be no compaction. Thus, by using this magnetic model, an astronaut placed within an imaginary propulsion craft, as illustrated in this paper, will not necessarily experience inertia [compaction]. Consequently, very high accelerations could be achieved without harm to the astronaut.



Frog diamagnetic levitation.jpg From Wikipedia, the free encyclopedia

Appendix 3

Notice the resemblance of the shape of the hypothetical propulsion device described in this paper relative to the UFO

phenomenon. Even the triangular shaped UFO has circular lights on its undersurface, In addition, the underside of the

UFO may be associated with a contracted magnetic field rather than an expanded magnetic field as hypothesized in this paper, again there is propulsion. Furthermore, UFO's are associated

with a strong magnetic field, propel along their axis and emit powerful magnetic pulses, as well as electromagnetic radiation.



Images from best UFO pictures ever taken
<http://www.ufocasebook.com/bestufopictures.html>

