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Consideration of Magnetic Lines of Force as Magnets Produced by Percussion Waves

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***Abstract*—**Considering magnetic lines of force as a vector magnetic current was introduced by convention around 1830. But this leads to a dead end in traditional physics, and quantum explanations must be referred to explain the magnetic phenomenon. However, a study of magnetic lines as percussive waves leads to other paths capable of interpreting magnetism through traditional physics. The concept was explored by examining the behavior of two parallel electric current cables, which attract each other when the current goes in the same direction, and its application at a microscopic level inside magnets. Consideration of magnetic lines as magnets themselves would mean a paradigm shift in the study of magnetism and open the way to provide solutions to mysteries of magnetism until now only revealed by quantum mechanics. This groundbreaking study discovers how a magnetic field is created, as well as reason how magnetic attraction and repulsion work, understand how magnets behave when splitting them, and reveal the impossibility of a Magnetic Monopole. All of this is presented as if it were a symphony in which all the notes fit together perfectly to create a beautiful, smart, and simple work.

***Keywords*—**Magnetic lines of force, magnetic field, magnetic attraction and repulsion, magnet split, magnetic monopole, magnetic lines of force as magnets, magnetic lines of force as waves.

I. Introduction

MAGNETIC lines of force are like a painted picture that can and should be studied. Lines appear as visible manifestations of the underlying magnetic field [1], which remains shrouded in mystery. Understanding the origins of these lines is a complex endeavor, often overlooked by researchers. This paper directly studies how these lines are formed, and from the way they are built as percussion waves, we draw the conclusion that the lines behave like an electromagnet, akin to magnets themselves. This idea serves as a starting point to try to explain the great questions of magnetism: magnetic attraction and repulsion; and, poles of a magnet, etc. from a different point of view. Surprisingly, all these issues seem to be resolved in a simple and reasonable way.

II. Magnetic Waves

Interpretation of magnetic lines can be approached in two ways: as vectorized magnetic currents [2], or as waves produced by current cable, as crystal waves produced by a blow.

This study will focus on the simplest method of considering “magnetic lines as waves”.

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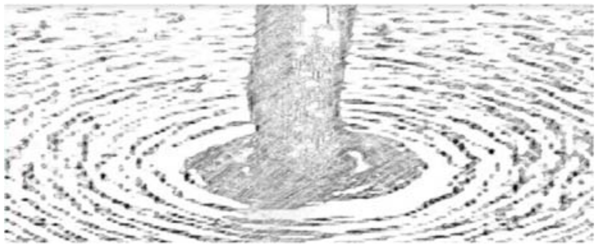

Fig. 1 Magnetic lines produced by an electric current cable

Fig. 2 Crystal waves

A. Magnetic Waves Formation

When a potential difference is established in an electric wire, electrons flow in the direction of the current. Simultaneously, the surrounding air molecules experience an electrostatic force that draws them to the wire. This attraction causes an ionized circle that curves as it ascends or descends perpendicularly depending on current direction.

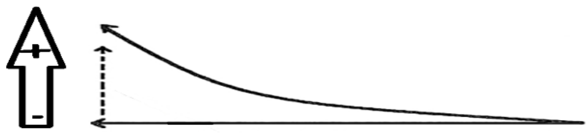

Fig. 3 Electric current wire influence

Ionized circle around electric current cable rises in the same direction as current do on cable. This rise is greater near cable and less at furthest points; which causes fractures.

The ionized circle breaks down, generating electrical waves.

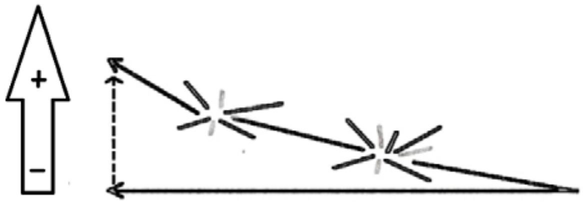

Fig. 4 Break points

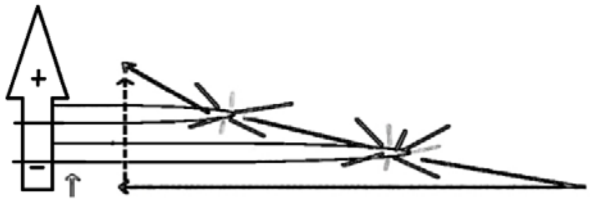

Fig. 5 Magnetic waves formation

Fig. 6 Side perspective of magnetic waves formed by current electric cable

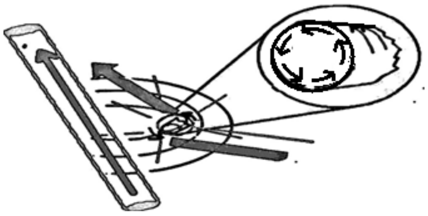
Fig. 7 Circular current formed on air, on point of break

III. Magnetic Lines as Magnets

The perimeter current of a magnetic line forms ridges on the surrounding air, effectively creating an electromagnet [3], in which current flows through a solenoid, and when contact with a ferromagnetic material, such as iron filings, magnetizes and turns them into a temporary magnet.

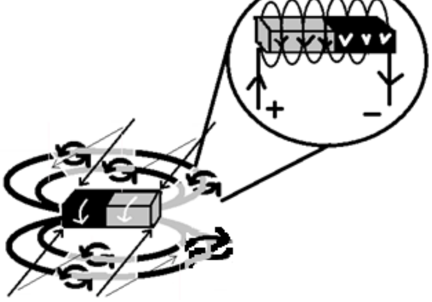

Fig. 8 Magnet formation on lines of force

Now lines of force can be considered as magnets.

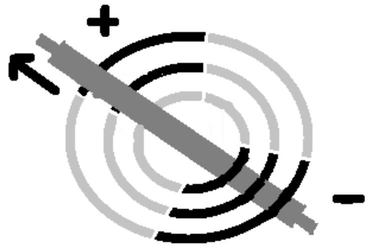

Fig. 9 Lines of force as magnets

IV. Magnetic Lines Spectrum

Power cable magnetic lines spectrum is similar to a magnet lines spectrum.

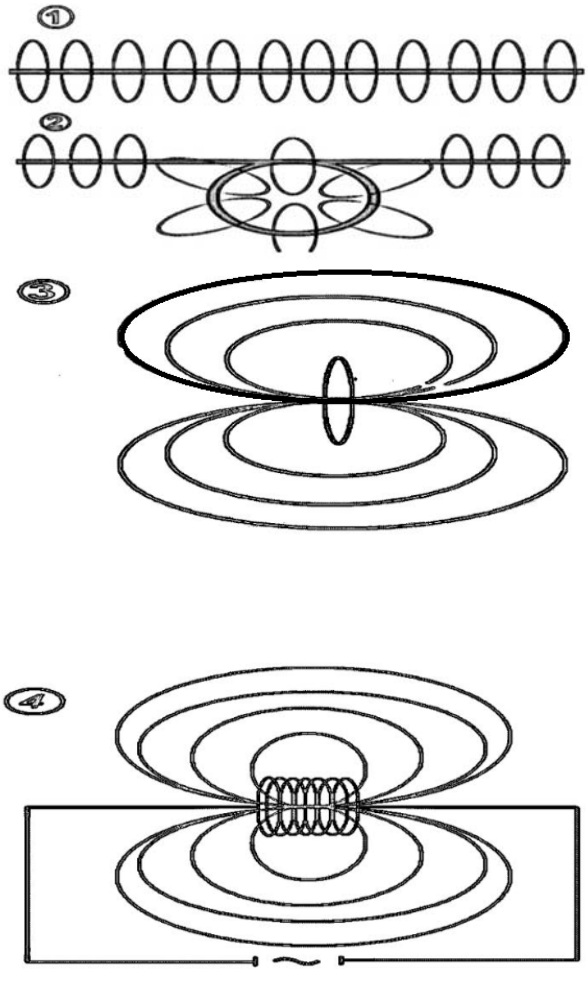

Fig. 10 Magnetic field created by a solenoid

The magnetic field produced by a solenoid reminds us of the magnetic field produced by a magnet. The similarity between the two leads us to deduce that the two fields have a similar cause. And this is how [4] Ampère himself considered it.

Ampère explained existence of permanent magnets by introducing the idea of permanent magnets are produced by a small current at molecular level that he called the electrodynamic molecule and whose result is a surface current, the Amperian current, similar to the real current that circulates through a solenoid [4].

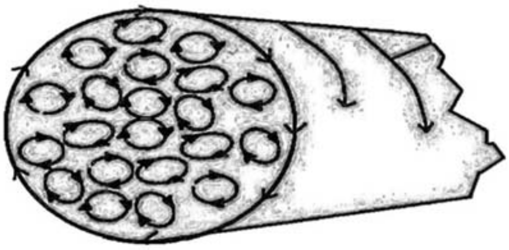

Fig. 11 Internal structure of a magnet

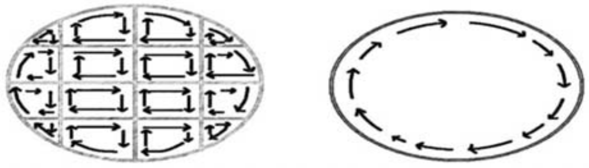

Fig. 12 Internal structure of a magnet

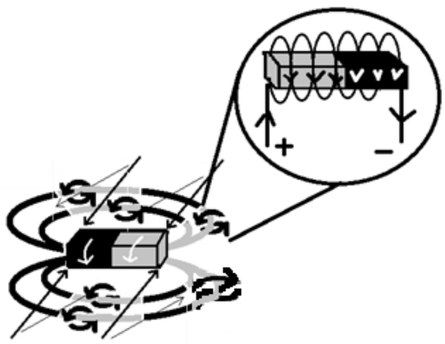

Fig. 13 Circular direction of electric current on lines of force

The rings of force indicate the direction of current flow along the magnetic lines, generating magnets on those lines with a defined polarity.

A. Flattened Waves Inside the Magnet

Waves formed by a current ring are flattened in the central region; and the same thing happens inside a magnet.

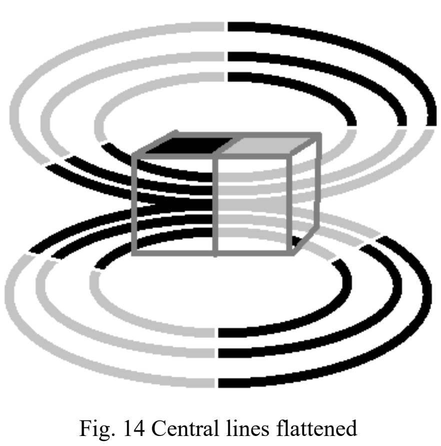

Fig. 14 Central lines flattened

In Fig. 14, the magnetic field lines inside a magnet exhibit behavior similar to magnets with aligned poles, resulting in a flattening effect.

It should be remembered that polarity of a solenoid depends on the direction of the electric current, and in this case, the circular direction of magnetic lines is facing the opposite direction forming a neck of lines with equal polarity.

V. Attraction and Repulsion through Lines of Force Like Magnets

The strength of magnetic attraction or repulsion between two magnets at a distance is directly related to the density of their magnetic field lines.

A. Anchor Effect

This phenomenon, analogous to the reinforcement of concrete embedded with steel rods that protrude from its interior, is attributed to the "anchoring effect" of magnetic field lines.

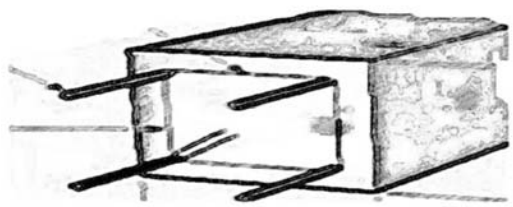

Fig. 15 Reinforced concrete

B. Ampère's Experiment: Electrical Current Cables in Parallel

In the experiment developed by André-Marie Ampère [4], he observed that when two parallel cables carrying current in the same direction, they attract each other. Conversely, when the current in both cables flows in the opposite direction, they repel each other.

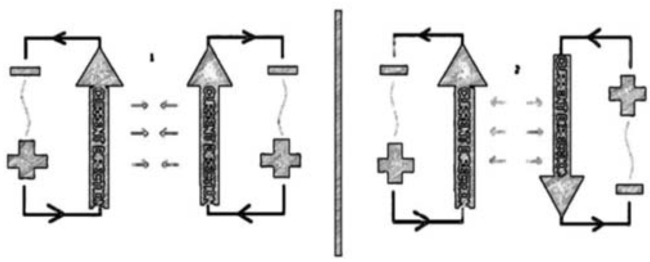

Fig. 16 Ampère experiment: two parallel electric currents cables

When two loops with currents flowing in the same direction approach each other, they attract each other; however, if the currents in the loops flow in different directions, they repel each other as shown in Fig. 17.

C. Attraction

When two magnets approach each with opposite poles facing, the magnetic field lines form aligned current loops on their approaching surfaces, resulting in an attractive force (Ampère's experiment). This phenomenon resembles the attraction observed between two magnets approaching through opposite poles.

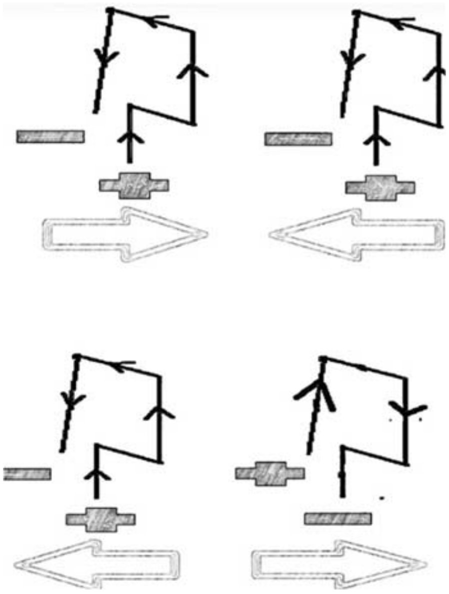

Fig. 17 Two parallel electric currents loops

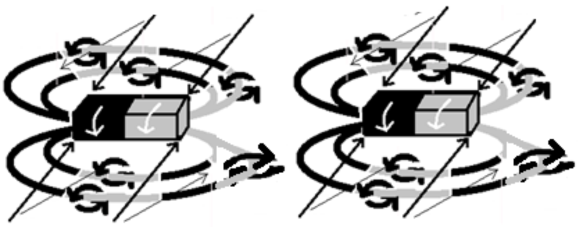

Fig. 18 Two magnets approaching by opposite poles

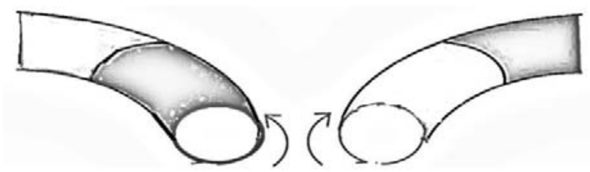

Fig. 19 Approach of magnetic lines by opposite poles

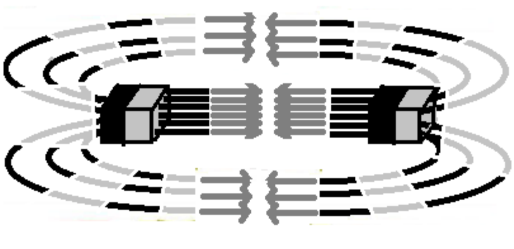

Fig. 20 Lines and magnets attraction

Magnetic field lines align with current loops in the same direction, leading to a tendency for the lines to converge and interpenetrate, causing the magnets to be dragged together due to the anchoring effect.

D.Repulsion

Effects are produced by approaching 2 magnets by equal poles.

Fig. 21 Magnets approaching by equal poles

Fig. 22 Two lines approaching by equal poles

When two magnets approach each other with like poles facing, lines of force maintain current loops of opposite direction in their approaching face and repel each other (Ampère Experiment). This phenomenon resembles the repulsion observed between two magnets approaching through like poles.

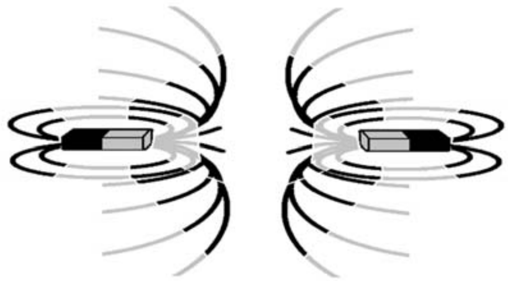

Fig. 23 Magnets repulsion

Magnetic field lines behave similarly to magnets approaching each other laterally with currents flowing in opposite directions, resulting in repulsion and flattening.

During repulsion, the lines remain separated from rather than touching, and due to the anchoring effect, they cause nearby magnets to move apart.

VI. Consequences of Lines of Force as Waves

A. Magnet Partition

The behavior of partitioned magnets can now be explained:

Magnet Longitudinally Partition

When a magnet is cut longitudinally, the magnet field lines on the cut face encounter circular currents of opposite directions. This causes the lines to flatten and repel each other.

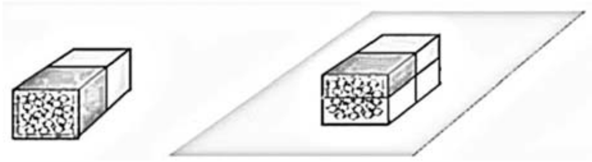

Fig. 24 Magnet longitudinally partition

Fig. 25 Magnets lines electrical current loops

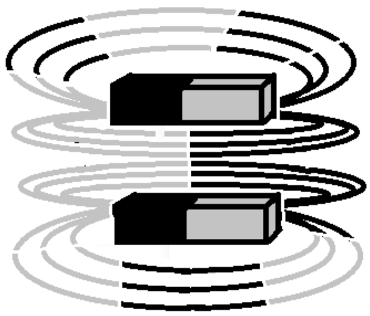

Fig. 26 Magnetic lines flattened

Magnetic lines formed between the fractured faces of a partitioned magnet repel each other, mimicking the behavior of magnets approaching laterally with like poles. These lines flatten and, due to their anchoring effect, exert outward forces on the magnet pieces, causing them to repel each other.

By cutting a magnet lengthwise to its poles, the resulting two pieces repel as they approach each other on the cutting face; after they have been united together as a single magnet before cutting.

Transversal or Perpendicular Partition to Direction of the Poles

The magnet field lines of two partitioned magnets, when facing electrical loops of the same direction, exhibit a tendency to converge and interpenetrate. This convergence, known as the anchoring effect, results in a force that draws the magnets together.

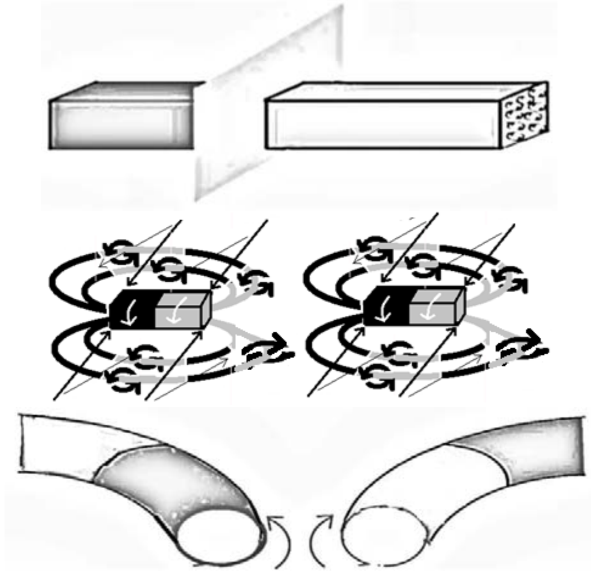

Fig. 27 Transversal partition

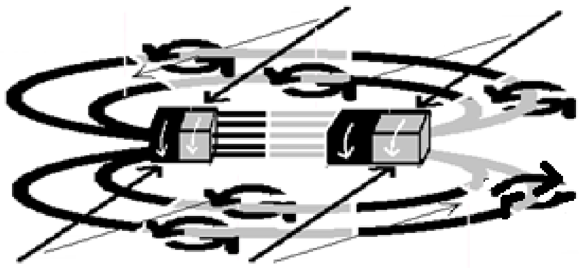

Fig. 28 Magnetic lines approaching by opposite poles

B. *Magnetic Monopole [5]*

The concept of magnetic monopoles, which are isolated magnetic poles, is replaced by the understanding that magnetic fields are fundamentally dipolar, meaning they always exhibit two poles. This inherent duality is attributed to the direction of loops of electronic current within magnets.

Consequently, in all magnet partitions, regardless of the partitioning method, the resulting pieces will always retain both north and south poles. This observation extends to solenoids, coils of wire carrying an electric current, where dividing them into two sections will also preserve the two poles, as long as the current direction remains consistent both parts.

VII. Conclusion

Magnetic lines of force are magnets themselves.

Magnetic lines are embedded inside the magnet, so by pushing or pulling magnetic lines; magnet could be pushed or pulled (Anchor Effect).

When two magnets are brought together, lines of both behave like magnets and when these lines attract or repel each other, they attract or repel the other magnet.

Now magnet attraction and repulsion can be explained with classical mechanics without using quantum mechanics.

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[3] Sturgeon, W. (1825). «Improved Electro Magnetic Apparatus». *Trans. Royal Society of Arts,*

[4] Andre-Marie Ampère:1820 "Archives of the Paris Academy of Sciences", pp.4-6.

[5] Paul Dirac 1931, published his article "Quantum singularities in the electromagnetic field" in the Proceedings of the Royal Society, in which he suggests that the magnetic monopole exists.

Angel Perez Sanchez, born on 1961 in Madrid, Spain and study in Comillas (ICADE) University (Madrid-Spain), and get legal-lawyer degree on 1986, Independent Researcher, Scientific writer.

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- "Finally a Reasonable Theory of Everything"
- "Crystal Essence"

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He got "Best Presentation Award" on "International Conference on Accelerating Universe, Dark Energy and Explanatory Models" ICAUDEEM in October 2023 in London with presentation "Consideration of Starlight Waves Redshift as Produced by Friction of These Waves on Its Way through Space"