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ELEMENTS OF THE MAGNETIC LINES OF FORCE

By: Mahmoud E. Yousif
E-mail: yousif@exmfpropulsions.com/
C/O Physics Department - The University of Nairobi
P.O.Box 30197 - Nairobi-Kenya

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ABSTRACT

Magnetic interaction hypotheses (***MIH***) consider magnetic lines of force (***MLF***) as an interaction medium for charged particles, where several mechanisms take place. For importance of ***MLF***, this paper shows elements such as, the number of ***MLF*** per unit area, number of MLF along sides of an area, distance between two ***MLF***, as derived from specific magnetic field. It also shows how to obtain magnetic field when these elements are known.

1- INTRODUCTION

Based on the magnetic interaction hypothesis (***MIH***) [1], magnetic lines of force (***MLF***) or magnetic centers of intensities (***MLF***) have primary elements, such as the number of ***MLF*** in square metre, number of ***MLF*** along side of such an area and the distance between two ***MLF***. Knowledge of these elements represents the bases for building higher blocks for phenomenon such as the energization of charged particles on macro-scales. These higher blocks could help unlock several mysteries, among them are: The nuclear fusion mechanism [2], aurora mechanisms [3] and others [4]. This paper report derivation of these elements, it also gives the equivalent magnetic field when any of these elements is known.

2- ELEMENTS OF MAGNETIC LINES OF FORCE

By introducing the convention that specific magnetic lines of force (***MLF***) represent a specific magnetic field, Michael Faraday gave amount producing one volt [5]. Since the number of ***MLF*** is the main factor behind magnetic field strength (B), [6], therefore magnetic flux density and magnetic field strength could be represented by an equivalent number of ***MLF***, where the magnetic field strength B, defined as " the number of flux lines per unit area that permeate the magnetic field, [7] is given by:

$$B = \frac{1\ weber}{1\ meter^2} \qquad T \qquad \{1\}$$

Since 1 Weber $=10^8$ Maxwell (M) [8], therefore Eq.{1} could be given by:

$$B = \frac{10^8}{1\,m^2} \qquad T \qquad \{2\}$$

1 web = 1 Tesla. meter^2 = 10^8 M

Magnetic field given by Eq. {2} is caused by specific number of ***MLF***. As showed by Faraday, one volt can be induced in a coil or a wire if it cuts 10^8 ***MLF*** per second, induced e.m.f. is one volt per turn [5].
Therefore any magnetic field strength "B" is transferable to an equivalent number of ***MLF*** such that

$$N_A = B \times 10^8 \qquad \{3\}$$

Where, B is the magnetic field in Tesla (T), N_A is the equivalent number of ***MLF*** in a cross-sectional area of one square metre and due to the field B, 10^8 is the determined number of ***MLF*** in cross-sectional area of one meter square due to magnetic field strength.
Number of ***MLF*** along each sides, is denoted by "N_S", it is given by:

$$N_S = \sqrt{B \times 10^8} \qquad \{4\}$$

Where L_S give the number of ***MLF*** along a distance of one meter.
Along each meter, the distance between two ***MLF***, varied accordance to the strength of a given magnetic field, this distance is denoted by "D" such that

$$D = \frac{1}{\sqrt{B \times 10^8}} \qquad \{5\}$$

3- DERIVING MAGNETIC FIELD FROM THE ELEMENTS

If specific number of ***MLF*** "N_A" is known, the equivalent magnetic field intensity B is derived by

$$B = \frac{N_A}{10^8} = \frac{{N_S}^2}{10^8} = \frac{1}{D^2 \times 10^8} \qquad \{6\}$$

If the number N_S of the ***MLF*** along one metre is known, the equivalent magnetic field intensity ' B ' is given by

$$B = \frac{{N_S}^2}{10^8} \qquad \{7\}$$

If the distance D between two ***MLF*** is known, its equivalent magnetic field intensity is derived by

$$B = \frac{1}{D^2 \times 10^8} \qquad \{8\}$$

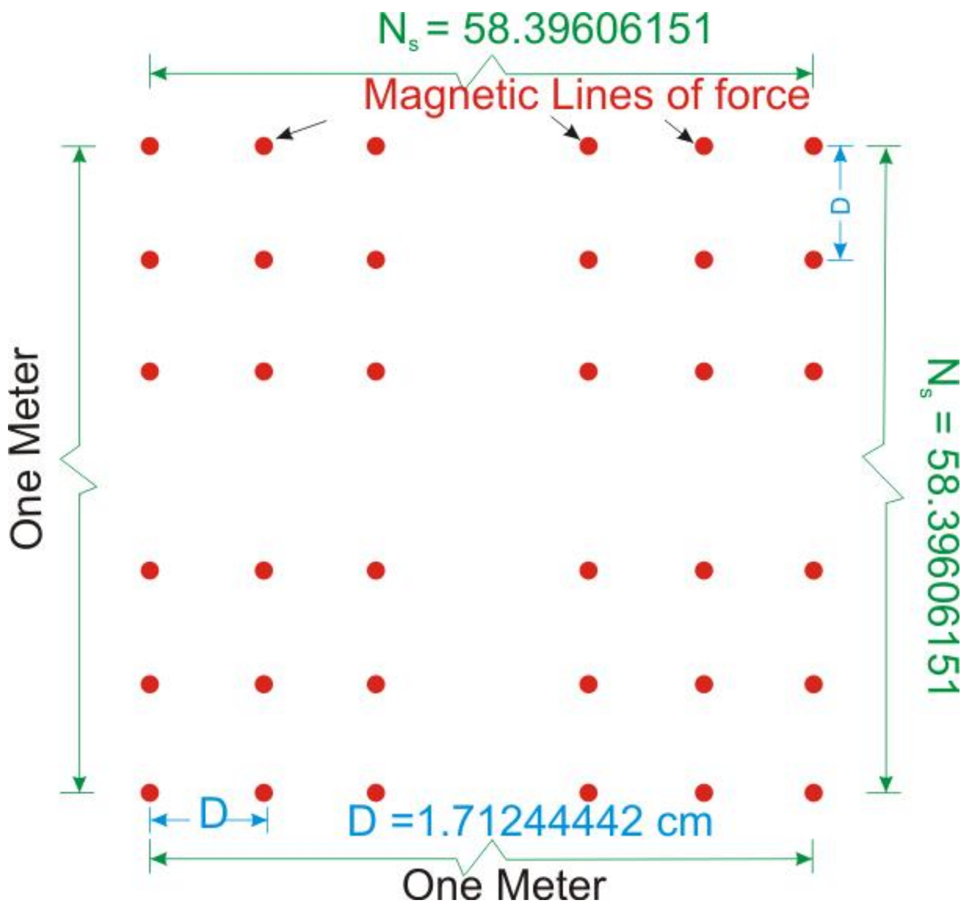

Fig.1. Cross-Sectional area showing elements of the geomagnetic lines of force at Nairobi (Kenya) observatory, as given by example 1, and shown in Table 1.

4- EXAMPLE

Measurements of geomagnetic field intensity, was carried out at Nairobi Observatory centre in June-1980 (Prof. J.P. Patel Physics Department, University of Nairobi), and gave 34101 Gamma (or 3.4101×10^{-5} Tesla).

Using Eqs.{3}, {4}, and {5} the number of ***MLF*** in square metre, the number of the ***MLF*** along one metre and the distance between two ***MLF*** at the observatory were calculated and are given in Table.1, while Fig.1 shows layout of these elements.

ELEMENTS	VALUE
N_A	34101 lines
N_S	58.39606151 lines/metre
D	0.017124442 metre (or1.7124442 cm)

Table.1. The elements of geomagnetic lines of force at Nairobi Observatory. It shows number of the geomagnetic lines of force (N_A), number along each sides N_S (of one metre), and the distance between two magnetic lines of force (D), using Eqs.{3}, {4}, and {5}, as shown in Fig.1.

5- CONCLUSION

1- Magnetic lines of force (***MLF***) could have the name of magnetic centers of intensities (***MLF***).
1- Elements of ***MLF*** enrich the knowledge of understanding magnetic field.
2- Any magnetic field or geomagnetic field elements can be determined using these equations.
3- Since the aim of this paper is to prepare the ground for further studies, therefore this paper is regarded as a reference.

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