

Different Approaches of EMF Meter

Mrs. A.G.Andurkar

Assistant Professor,
Electronics and Telecommunication department
Government College of Engineering, Jalgaon, India

Abstract— EMF meter that is commercially available is a meter that senses e.m.f and displays e.m.f in μT i.e micro Tesla. A series of readings taken in east direction, west direction, North direction and south direction which are basic directions shows that e.m.f is highest for a particular direction, whereas it is lowest for a particular direction. Thus e.m.f meter can identify directions, if e.m.f readings and directions are studied. so e.m.f meter can be used if corresponding e.m.f readings and directions are studied , to show directions directly similar to a magnetic compass.

Another approach is to detect presence of water or e.m.f absorber materials like Al, presence of plants etc. If emf meter readings during rainy season are deeply studied during lightening, certainly the readings can show rapid increase, and hence a meter can be developed to predict occurrence of a lightening (of course powerful lightening) which can save lives of people and property.

IndexTerms— electromagnetic field, e.m.f meter, directions, detection, lightening etc.

I. INTRODUCTION

A time varying magnetic field produces an electromotive force which may establish a current in a suitable closed circuit. An electromotive force is merely a voltage that arises from conductors moving in a magnetic field or from changing magnetic fields.

Faraday's law is stated as

$$\text{e.m.f} = -d\phi/dt \quad v$$

A non-zero value of $d\phi/dt$ may result from any of the following situations:

- 1.A time changing flux linking a stationary closed path.
2. Relative motion between a steady flux and a closed path.
- 3.A combination of the above two.

The minus sign is an indication that the e.m.f is in such a direction as to produce a current whose flux, if added to the original flux would reduce the magnitude of the e.m.f

This statement that the induced voltage acts to produce an opposing flux is known as lenz's law.

E.M.F meter is commercially available which measures e.m.f in μT i.e micro Tesla.

If the e.m.f meter is pointed towards east direction, it shows certain value of e.m.f. similarly the meter shows certain values for west, north and south direction.

An experiment is conducted in which 15 readings are taken for e.m.f in east direction.15 readings are taken in west , 15 readings are taken in north .and 15 readings are taken in south. The mean values for e.m.f in each direction are calculated. Such readings are taken repeatedly at different timings i.e during morning, during afternoon, evening and at night.

The readings clearly show that e.m.f is least in east direction, and highest in south direction.e.m.f is slightly greater in west direction than east.e.m.f in north is less than e.m.f in south.

The above experiment indicates that emf meter can be used as a meter showing directions, similar to a magnetic compass if the readings of emf and directions are keenly studied. Thus a new meter can be developed which can indicate directions on the display from the knowledge of emf values.

A digital meter can be constructed to show directions using a microcontroller chip and emf pattern.however emf meter will form a base on which new digital meter can be developed.

Another modification possible in e.m.f meter is that of a meter detecting presence of plants or emf absorber materials like water,Al metal, etc. when emf meter is used to measure emf it shows some emf , however when it comes in vicinity of plants or water or Al .the emf values decrease.hence emf meter can be converted in a meter which can detect presence of plants, water or other emf absorber metals. However to achieve this the readings of emf in vicinity of plants in a particular geographical area should be studied keenly.

II SYSTEM DEVELOPMENT:

1.Development of direction meter:

The emf meter can be used as a direction detector similar to a magnetic compass. In any geographical location, the emf is least in east direction,less in west , higher in north and highest in south direction.Some modifications can be made in emf meter to convert it into digital direction detecting meter such as:

a.The meter should have display to show directions such as east, west etc. It should have microcontroller .

b. A loudspeaker can also be provided in meter to have audio output.

2.Development of meter detecting presence of plants or other emf absorbing materials:

This application requires a thorough study of geographical region and set of readings of emf in all directions in all seasons. Accordingly comparing readings in geographical region and emf readings in all directions,in all seasons, the presence of plants or other emf absorbing materials can be detected .The modified meter will require a microcontroller, and digital display.

III Results and Discussions:

Direction	Mean value of Radiation
EAST	37.94 μ Tesla
WEST	41.75 μ Tesla
NORTH	42.84 μ Tesla
SOUTH	38.32 μ Tesla

Table 1

parameters	Minimum and max values	Mean value of Radiation measured at minimum values	Mean value of Radiation measured at maximum values
Rainy atmosphere (at home)	32 μ Tesla, 35 μ Tesla	33.565 μ Tesla	23.098 μ Tesla
Rainy atmosphere (outside home)	34 μ Tesla, 36 μ Tesla	33.86 μ Tesla	35 μ Tesla
Rainy atmosphere (outside home)	37.94 μ Tesla,,42.84 μ Tesla,	37.94 μ Tesla,	42.84 μ Tesla,

Table 2

Each experiment is repeated 15 times and then mean value of radiation is decided in above tables.

parameters	Mean value of Radiation measured at minimum values during day time	Mean value of Radiation measured at maximum values during evening.
Radiation near plants such as aloe vera and cactus	33.86 μ Tesla(for aloe vera) 33.47 μ Tesla(for cactus)	38.53 μ Tesla(for aloe vera) 39.47 μ Tesla(for cactus)

Table 3

Direction	Mean value of Radiation
EAST	42.47 μ Tesla
WEST	40.07 μ Tesla
NORTH	40.67 μ Tesla
SOUTH	40.73 μ Tesla

Table 4

IV Conclusions:

EMF meter is basically used to detect emf. However it can be used to identify directions similar to a magnetic compass. It can also be modified to a meter which detects presence of plants or emf absorber materials such as water ,Al. EMF meter can also be used to detect occurrence of lightening.

In cold atmosphere it is observed that emf readings obtained are less in value. As a future scope whether decreased emf can prevent global warming can be studied.