

# Rotating Bodies Do Have Magnetic Field

C. Ganesa Moorthy<sup>1</sup>, G. Udhaya Sankar<sup>2</sup>, G. Rajkumar<sup>3</sup>

<sup>1</sup>Department of Mathematics, Alagappa University, Karaikudi, Tamil Nadu, India

<sup>2</sup>Department of Physics, Alagappa University, Karaikudi, Tamil Nadu, India

<sup>3</sup>Department of Electrical and Electronics Engineering, Nehru College of Engineering and Research Centre, Pampady, Tamil Nadu, India

## ABSTRACT

The existence of magnetic field of earth is justified in this short research note through the classical right hand palm rule for current and magnetic field.

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## I. INTRODUCTION

The existence of magnetic field of earth is always associated with the existence of magnetic materials and hot matters in core part of earth, when hypotheses are proposed for this existence of magnetic field (see, for example [1,2]). A new hypothesis based on “electron density” (which may be defined as the number of electrons per unit volume or defined as the mass of electrons per unit volume) is proposed in this short research note.

## II. METHODS AND MATERIAL

### Right Hand Palm Rule

When a direct current from a battery is passed through a conducting wire, a magnetic field is produced around the wire. The followings are assumed in existence of this magnetic field: (a)Electrons are moving along the wire, and moving electric field of charges of electrons create magnetic field; (b)It is being unknown about movements of protons and neutrons; and (c) Charges in protons do not affect the magnetic field created by charges in electrons. Let us recall the classical right hand palm rule. Consider a coil connected to a battery that gives a direct current. If the coil is held in the right hand so that the fingers point in the direction of the current in the windings, then the extended thumb points in the direction of the magnetic field. This rule is applicable even for a single current loop carrying

current. That is, this rule is applicable for a single circular loop in which electrons move in a particular direction. However, the direction of the current is opposite to the direction of electron movements. In addition to this convention, it should be noted for discussions in the next section that the north magnetic pole of the earth is near to the south geological pole.

## III. RESULTS AND DISCUSSION

### Existence of Earth Magnetic Field

Consider any imaginary circle on the earth (or, inside the earth), such that its centre lies in the axis of rotation and the circle lies on a plane that is perpendicular to the axis of rotation. The materials of this circle rotates about its axis of rotation. So, the electrons of the materials of this circle move along the circular path in the rotating direction of the earth. Let us apply the final version of the above mentioned right hand palm rule to each such circle, for circular movements of electrons, by considering each circle as a single circular loop. Then, one can understand the existence of present magnetic field of earth, along with the direction of this magnetic field.

The existing direction of the magnetic field of the earth can be reversed, only if the direction of rotation of the earth can be reversed. The different electron density at different places and interior liquid flow of hot materials should affect symmetry in the magnetic field of earth. The magnetic materials in the earth may be a reason for

realizable intensity of the magnetic field. Although previous discussions are given for earth, they are applicable for every rotating object, because of movements of electrons create magnetic field. The movements of electrons lead to the following conclusions.

#### **IV. CONCLUSION**

1. Earth has magnetic field with existing direction.
2. All rotating bodies have magnetic field.

#### **V. REFERENCES**

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