Measuring magnetic field report examples

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Introduction.

The magnetic field β, in a solenoid coil of N turns with a medium magnetic permeability μ and length ⌊ through a current flow ɪ, can be computed from the following equation.

β = μNɪ ---------- equation 1.

β = μNɪ ⌊ = μNɪ ---------- equation 2.

⌊ (⌊2 + D2)½ (⌊2 + D2)½

The above equation 1 only provides the magnetic field strength at the center of the coil, but because unavoidable parallax errors on measurement would normally arise, the equation is modified by a correction factor D, the coils diameter and appears as in equation 2. Depending on the direction of currents flow, magnetic field in a wire or a solenoid coil is similar to those of magnet; north or south. The lab work is therefore aimed at using a computer to measure and determine the magnetic field strength differences and pattern on different items, moreover at various distances within the test surrounding.

Procedure and Observation.

- The apparatus were set up, the length of the coils measured and the Logger Pro software started.

- Once the instruments where confirmed to be operational, the magnetic field sensor was placed inside the solenoid, the power was turned on and adjusted to 1A.

The magnetic field strength inside the solenoid is high at an average of 5. 009 mT compared to when it is outside, its average value is 4. 678 mT. From the figure bellow, the magnetic field intensity is not constant at the coils interior but decreases from the center to the edges.

Similarly, while measuring the magnetic field as a function of distance, the β increases while the distance too increases whereas the current decreases. As shown in the table 2 below.

Materials.

The following materials were used to carry out the lab practical.

- Solenoid coil and a wire ring.

- DC power supply.

- Multimeter, switch, cables and compass.

In conclusion therefore, the magnetic field of elements are different depending on their properties and are thus used to determine the appropriate material for different usages and applications in electrical, mechanical and construction industries.