

# Electro magnetic

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Electromagnetic Teacher                      Electromagnetic There is a resulting line or linear graph after plotting the points that corresponded to the results when the current was varied. Thus, there exists a linear relationship after the current supply was altered. Using MS Excel, the line of best fit was drawn in order to serve as the basis for calculating the universal force during the time that the current was altered. Here is the formula:

2- The graph above indicates how much force resulted when the coil length was varied. The coil length was altered through a range between 20mm and 80mm. The resulting relationship was linear. MS Excel once more helped draw the line of best fit and helped conclude that the relationship was actually also linear. The resulting formula has the ability to calculate the exact amount of force in any given length of coil. Even when the length of coil was varied, the resulting relationship was still consistently linear. Here is the formula:

3- The plotted points above show the relationship between the force and the magnetic field when the latter was altered. The graph shows a rather approximate linear relationship, and the general equation or formula is based on the line of best fit that is made through MS Excel. The formula is as follows:

4- Other relationships plotted above the graph of force tended to have nonlinear relationships with the varied angle. Theoretically, current-bearing conductors in magnetic fields with respect to altered angles tend to form sinusoids. The sinusoid is dependent on a number of factors such as current, magnetic field and the length of the coil conductor. Given that every other condition remains constant, the plotted graph assumes the form of a sin graph. Perhaps, the only discrepancy here is that the magnetic field is

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expressed in the number of magnets and not in SI units. Magnetic field is usually expressed in Teslas (T) and so there was a calculation to determine how much the consistent value of equivalent teslas is on the six magnets.

The formula derived from this is as follows:

$$F = ILB \sin (\Theta); \text{ theoretical formula}$$

Considering that our current, magnetic field and coil length were all constant from the results table, a specific angle was replaced with a force value in order to determine the constant value of Teslas appropriate for the magnetic field of six magnets, thus,

Using  $F = 0.0105948\text{N}$ , with a given angle  $\Theta = 90^\circ$ ;

In order to obtain a consistent B value, the procedure above was repeatedly used on all other values of the angle. The results were then added up and divided by the number of angles.

Application:

1. The doubling of the current will increase the value by a factor of 0.0058, which means that the current is actually directly proportional to the calculated force. Thus, it is expected that the force would increase.
  2. The simultaneous reduction of the field to half and the coil length to twice its magnitude will reduce force by a factor of 0.00005 and at the same time increase by a factor of 0.004.
  3. There will be a gradual increase in the force if the orientation is changed from  $0^\circ$  to  $45^\circ$  and this is evident from the results of the experiment as well as from the summarized formulas.
- a. Electrical car that uses an electrical motor, basic ceiling fan
  - b. An electrical car that runs on an electrical motor has the purpose of preserving fossil fuels, thus reducing pollution in the immediate

environment. In fact, science has proven that an electrical car will have ideal efficiency, stability and speed with the correct sources of energy used to power its electrical motor. Moreover, the purpose of the ceiling fan is to reduce the temperature during a warm day, thus providing comfort to people, and indirectly creating a nice and comfortable environment with which people could do their daily tasks more efficiently.