

Magnetic field in a conductor

Group 12

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Aim: Determination of the magnetic field inside a conductor as a function.

1. Of the current in the conductor.
2. Of the distance from the axis of the conductor.

Apparatus:

Hollow cylinder, Power frequency, LF amplifier, Digital multimeter , plug pair, Meter scale, Tripod base, Connecting cord, Connecting cord, Hydrochloric acid.

Procedure:

1. A hollow metallic cylinder was first filled with the conductor HCl and then the connections were properly.
2. The coil was dipped in the conductor at a particular radius and the current was varied.
3. In the next part of the experiment the current was kept constant and the coil was moved from top part of the cylinder to the bottom part of the cylinder.

Observations: experiment part 1

current	voltage(v)
0	0.029
0.05	0.025
0.1	0.024
0.15	0.028
0.2	0.027
0.25	0.024
0.3	0.023
0.35	0.022
0.4	0.026
0.45	0.026
0.5	0.025
0.55	0.021
0.6	0.026
0.65	0.027
0.7	0.028
0.75	0.027
0.8	0.026
0.85	0.027
0.9	0.027
0.95	0.026
1	0.026

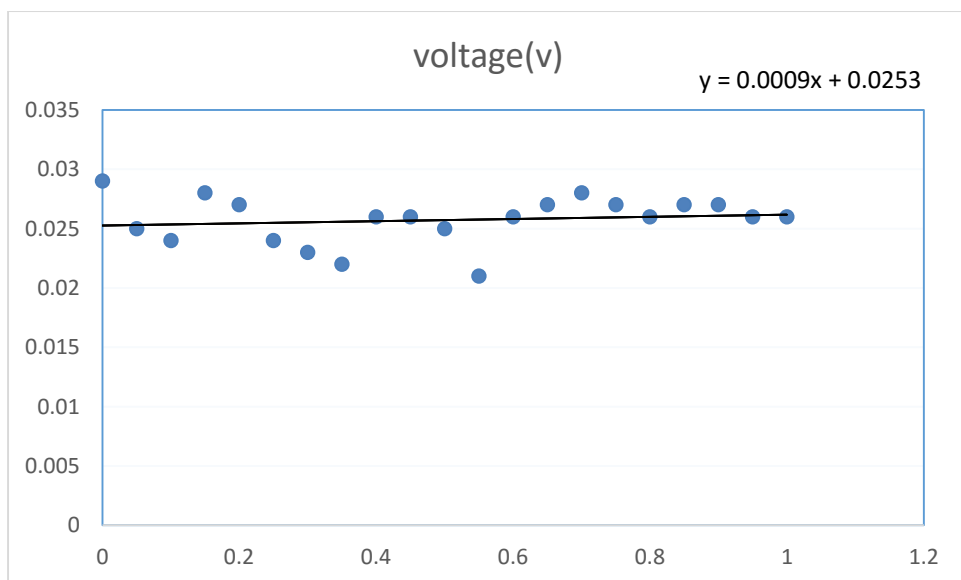
Experiment part 2

Initial reading(from top)=66cm

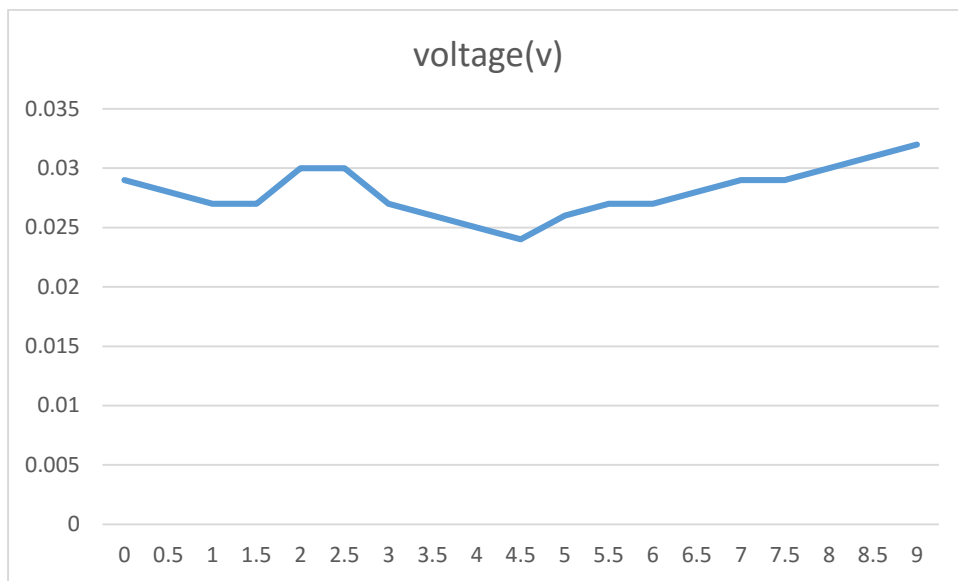
distance	voltage(v)
0	0.029
0.5	0.028
1	0.027
1.5	0.027
2	0.03
2.5	0.03
3	0.027
3.5	0.026
4	0.025
4.5	0.024
5	0.026
5.5	0.027
6	0.027
6.5	0.028
7	0.029
7.5	0.029
8	0.03
8.5	0.031
9	0.032

Graphs:

Experiment part 1



Experiment part 2



Precautions:

1. The aperture must not be tightly closed, so that gases released (H_2 , O_2) can escape.
2. Account must be taken of the fact that the magnetic field strengths to be measured lie in the micro Tesla range, i.e. the cables carrying the current - especially the return lead – also produce a magnetic field which is of the same order of magnitude.
3. Current should be kept less than 1 ampere.

Result:

Function of magnetic force with current in the conductor $y = 0.0009x + 0.0253$