The Magnetic Moment of a Permanent Magnet

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May 16, 2024

The objective of this experiment is to determine the magnetic moment of a permanent magnet. This will be done by measuring the strength of the magnetic field at various distances from the magnet.

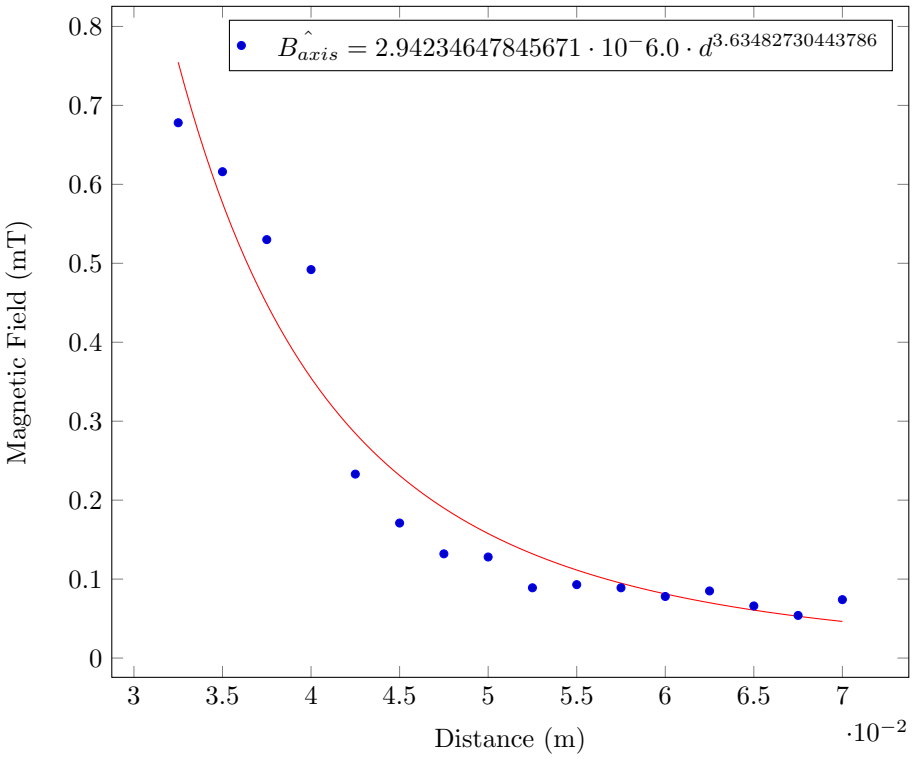
- Tape meter stick to the table and the sensor to the meter stick
- Attatch two disk magnets to either side of a protractor
- Starting at 0.0325m, measure the strength of the magnetic field at 0.0025m intervals until 0.07m

$$B_{axis} = \frac{\mu_0}{4\pi}\frac{2\mu}{d^3} \tag{1}$$

$$\hat{B_{axis}} = a \cdot d^b = 4.39e-6 \cdot d^{-3.499} \tag{2}$$

$$a = \frac{\mu_0 2\mu(10^3)}{4\pi} \tag{3}$$

$$\mu = \frac{4.39 \times 10^{-6}\,\mathrm{A\,T\,m^3}}{10 \times 10^{-7}\,\mathrm{T\,m\,A^{-1}}(10^3)} = 4.39 \times 10^{-3}\,\mathrm{A\,m^2} \tag{4}$$


$\hat{B_{axis}} = 2.94234647845671 \cdot 10^{-}6.0 \cdot d^{3.63482730443786}$
Magnetic Field (mT)
Distance (m)
$\cdot 10^{-2}$
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
3
3.5
4
4.5
5
5.5
6
6.5
7