PH170: Waves and Electromagnetics Laboratory (0-0-2:1)

Laboratory 5

https://vlab.amrita.edu/index.php?sub=1&brch=192&sim=972&cnt=1

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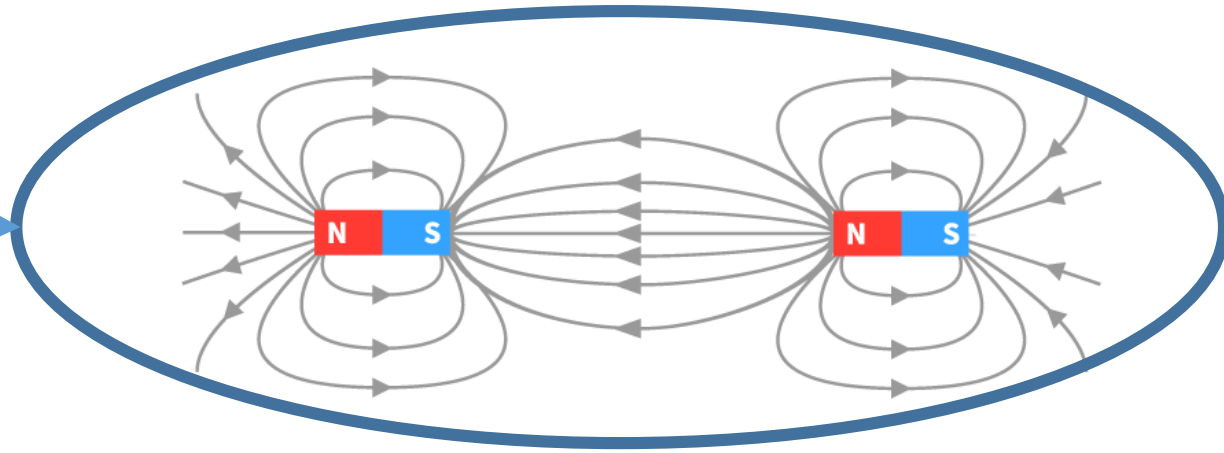
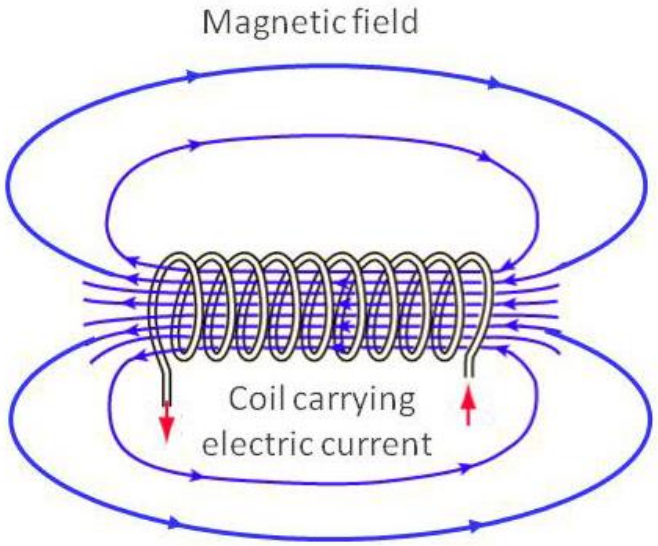
To study the variation of magnetic field with distance along the axis of a circular coil carrying current.

Magnetic Field is the region around a magnetic material or a moving electric charge within which the force of magnetism acts.



Inside a coil carrying current

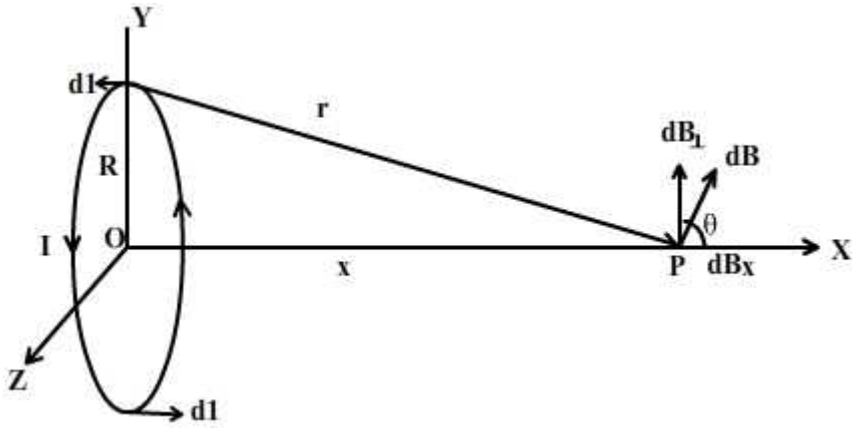


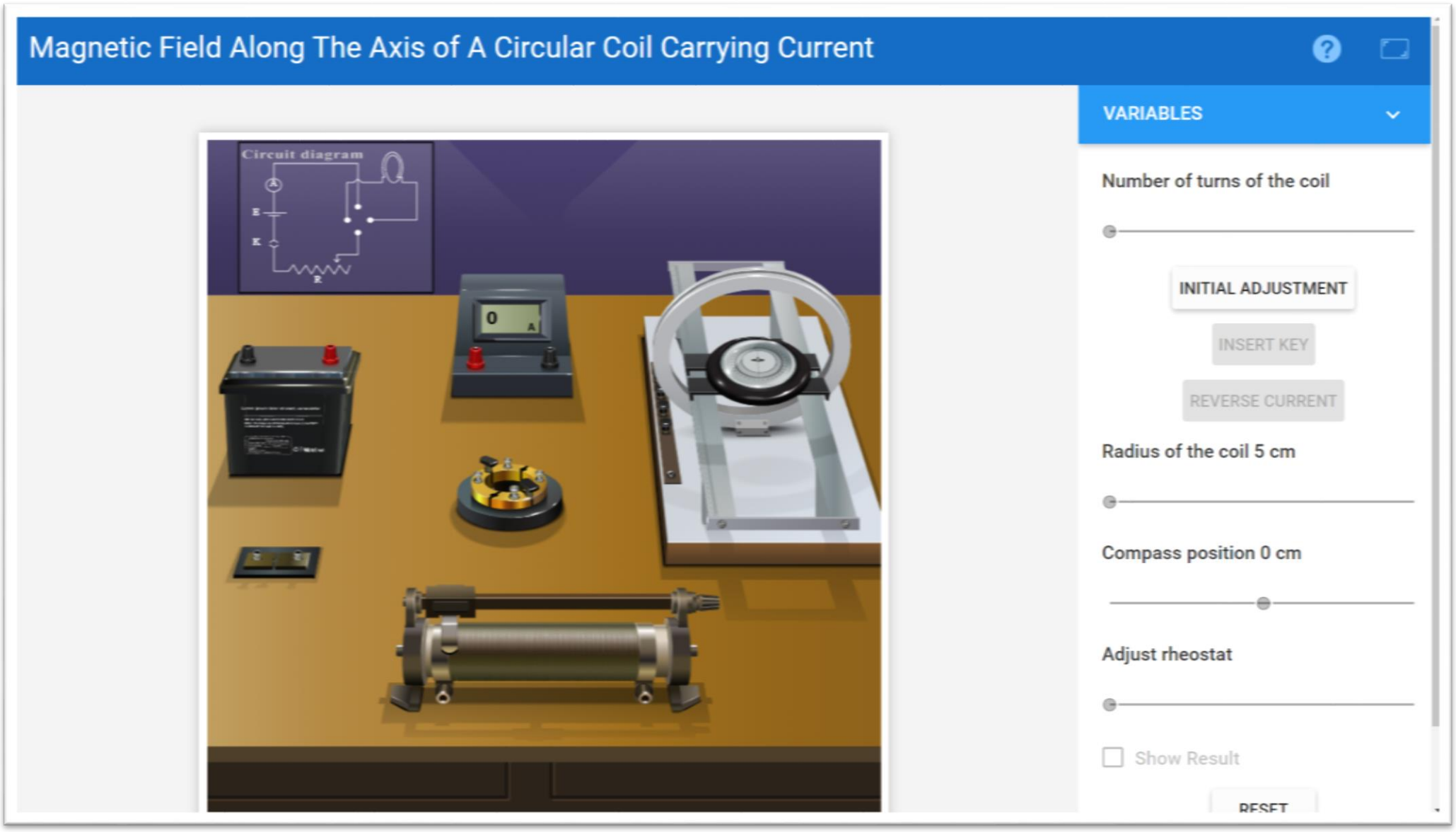
Along the axis of a coil carrying current

$$dB = \frac{\mu_0}{4\pi} \frac{i\, dl \times r}{r^3}$$

$$B_x = \frac{\mu_0 nI}{2} \frac{r^2}{(x^2+r^2)^{3/2}}$$

$$B_x = B_0 tan\theta$$





Step 1 : Make initial adjustments by aligning the compass and desk.

Step 2 : Connect the circuit as shown.

Step 3 : Insert the key.

Step 4 : Measure the current.

Step 5 : Measure the deflection by zoom compass tab.

Step 6 : Reset and repeat for different set of parameters.

AIM :To study the variation of magnetic field with distance along the axis of a circular coil carrying current.

OBSERVATION TABLE

B_0= 3.5x10^{-5} T; Current, I = …… A; No: of turns of the coil, n = …..; Radius of the circular coil, r = ….. cm.

Distance from the centre, x (cm)	Deflection with compass box on left side				Deflection with compass box on right side				Mean θ (degrees)	B_x(T)	$B_0 = \frac{B_x}{\tan\theta}$ (T)
	Direct		Reversed		Direct		Reversed				
	θ_1	θ_2	θ_3	θ_4	θ_1	θ_2	θ_3	θ_4			

** Plot a graph between distance and magnetic field.

Thank You