Lab- Assignment

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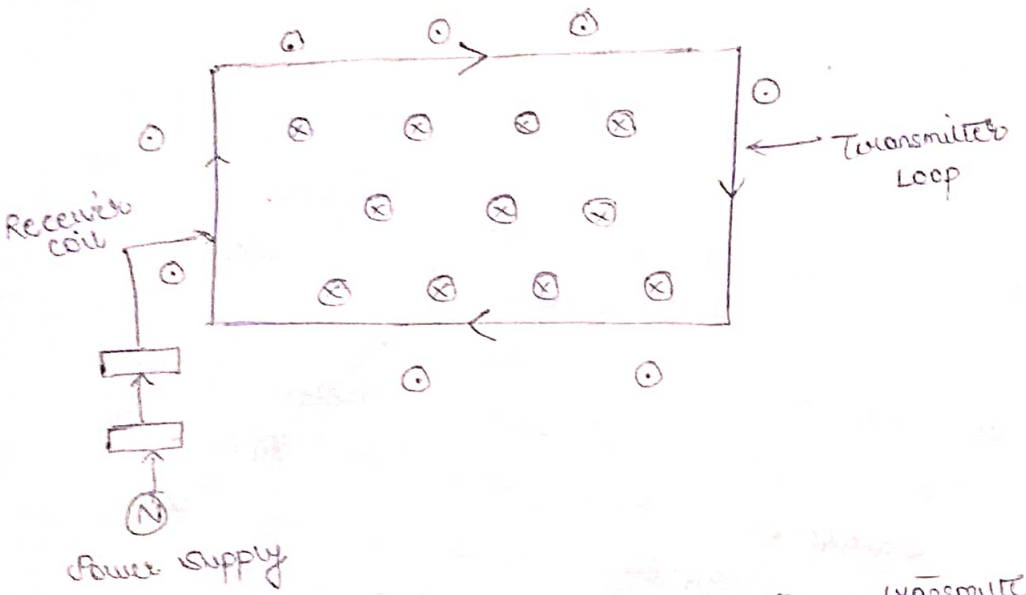
18EX20030

⇒ Figure 1 and explaination

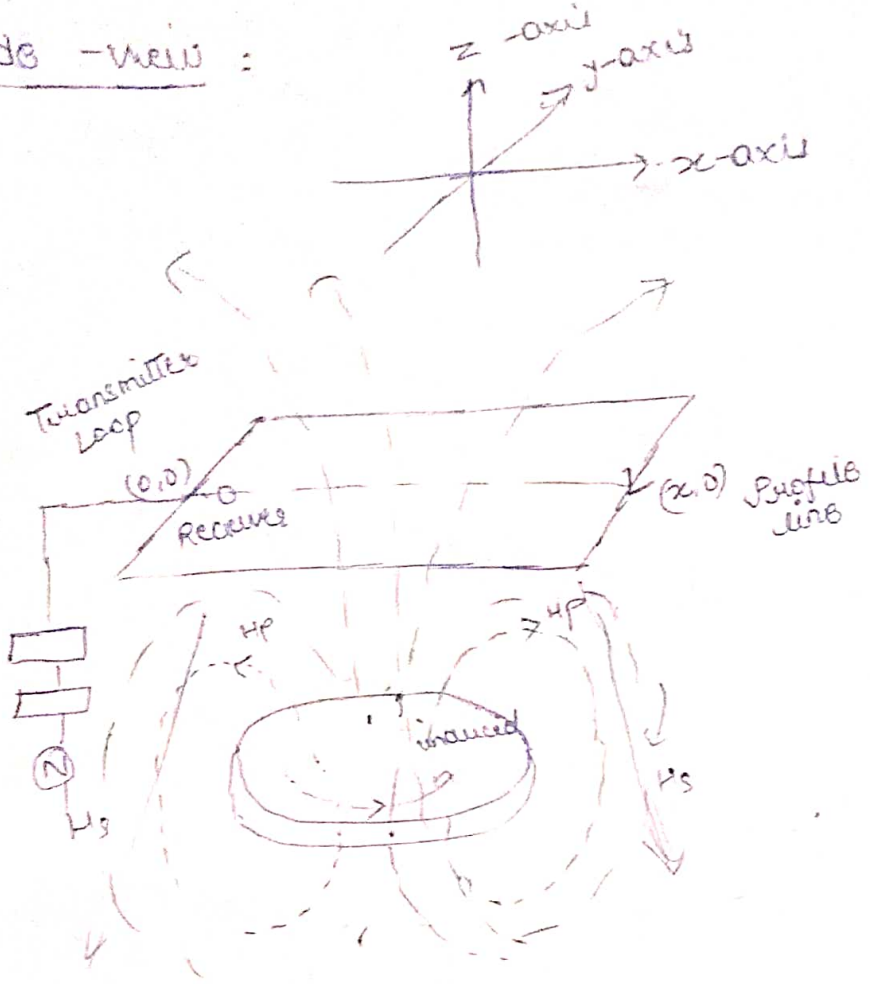
Current in transmitter loop = clockwise direction

Actual View



Primary magnetic field outside the transmitter loop primary magnetic field is coming out of the plane and inside the transmitter loop primary magnetic field is going inside the plane. because the direction of H_p is $\otimes$ is decided by right hand thumb rule. Fingers of right hand curl in the clockwise direction gives primary magnetic field direction by right hand thumb direction inside the plane of paper (inside the loop).

Side - view :

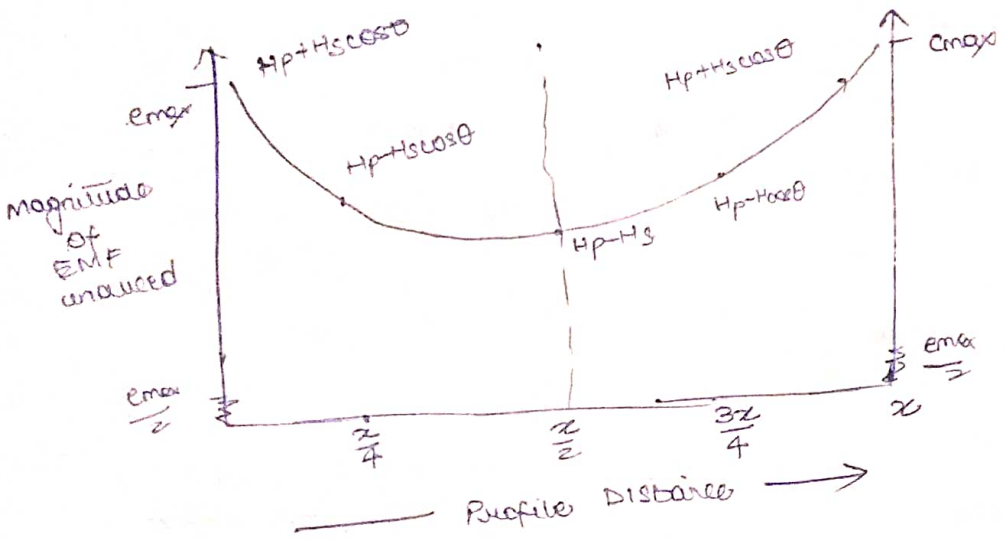


Direction of current in the conductor:

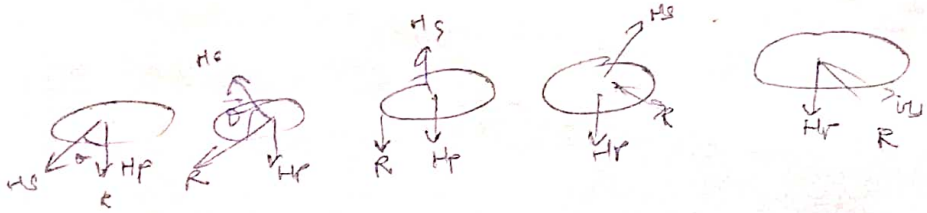
According to Lenz law, the current will be induced in the conductor such that the secondary magnetic field hence developed will try to oppose the primary magnetic field so in order to oppose Hp secondary magnetic field should flow in upward direction Hence by right hand thumb rule, in order to have Hs in upward direction from inside the conductor to oppose Hp, the current should flow in anti - clockwise direction inside conductor.

Direction of secondary field: From given explanation the secondary field should flow upwards from the conductor and should come back from downside of conductor..

↳ Figure 2: Receiver will measure only voltage component due to Hp and Hs.



Receiver coil



i) Hp and Hcosθ variation justify the graph in figure 2.

Justification for figure 3 Hp and Hs component with decrease of θ the receiver come to the centre due to component of θ

Figure 3 :- Receiver coil will measure only the x component of resultant field i.e secondary field x- component + primary field x- component

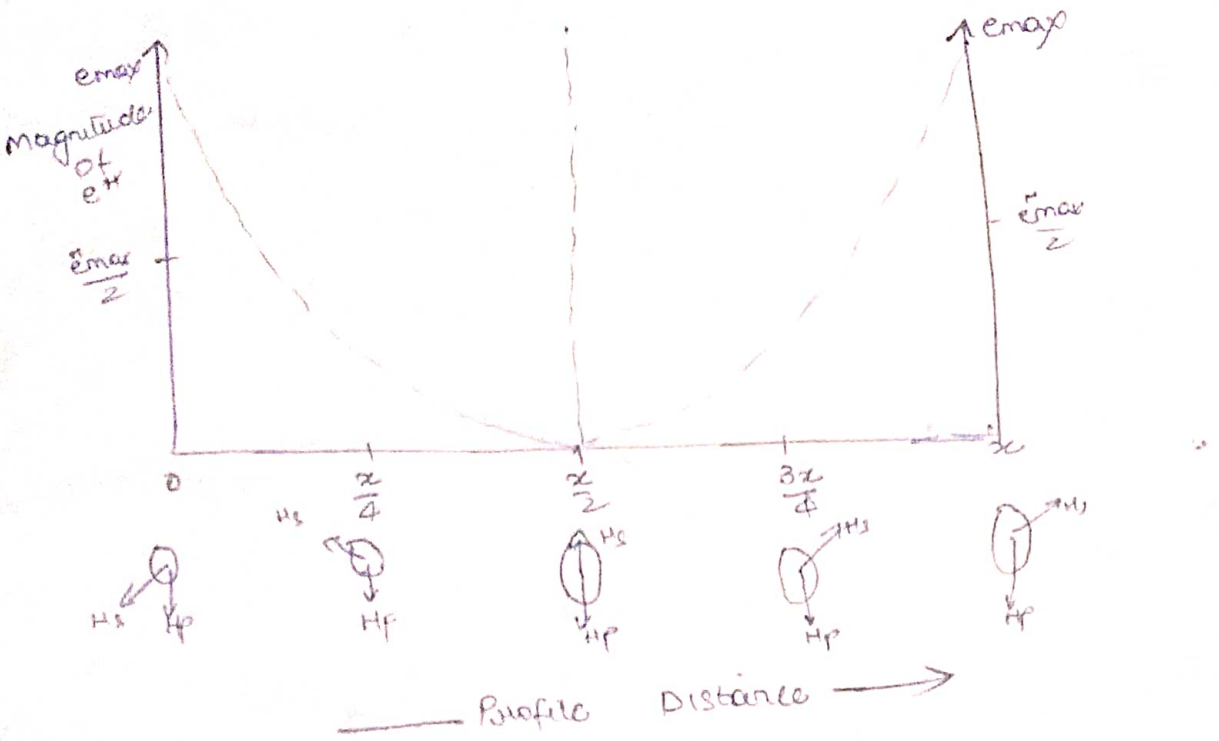


Figure 4 :- Receiver coil will measure only y- component of resultant field i.e secondary field y-component + Hp in y- direction.

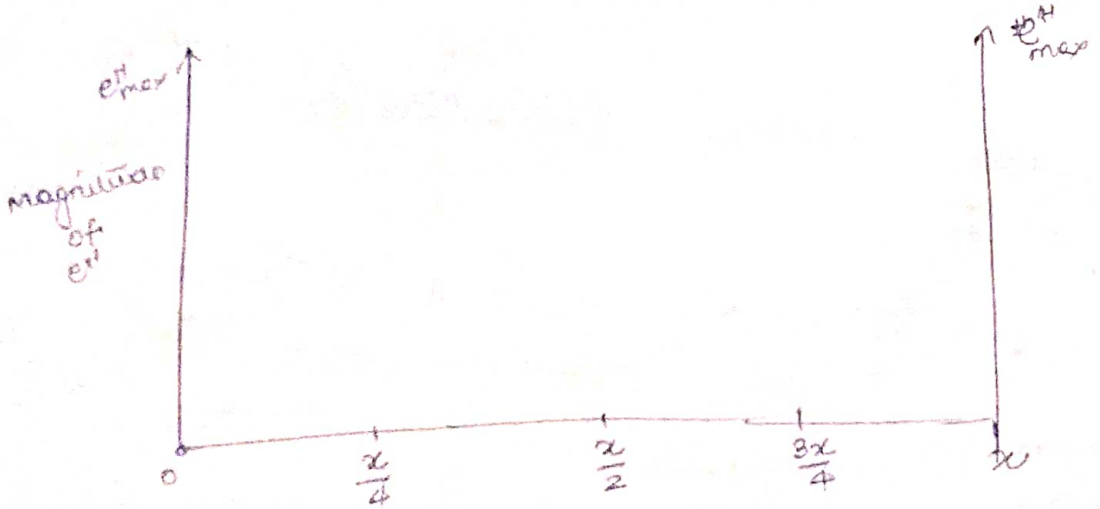


Figure 5 - EMF induced vs Profile distance due to H_x when compensation is applied

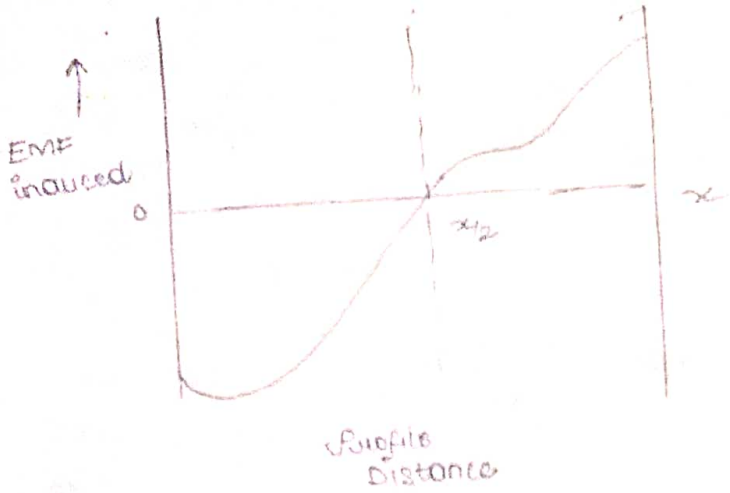


Figure 6 :- EMF induced vs Profile distance due to H_y when compensation is applied

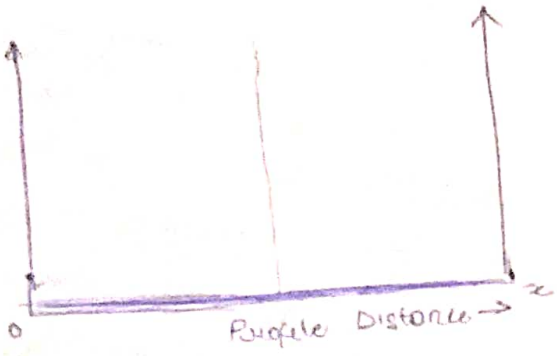
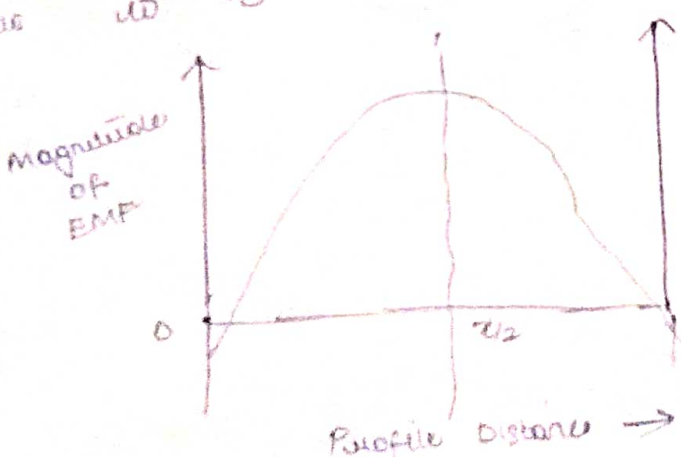


Figure 7 - EMF induced vs Profile distance due to H_y when compensation is applied



- Justification for figure 5:- The direction of Hs x- component will be negative till it reaches mid-point of the profile line and will be positive when receiver is on the right of mid-point of profile line. So the graph will be symmetric about the origin. It will go increasing in magnitude as receiver approaches to the centre of transmitter loop. If the transmission loop is greater in size then the Hs x- component will start to decrease in magnitude due to the same magnetic field line coming back.

- Justification for figure 7: Hs- z -component will be maximum at the centre of the loop and will go decreasing as we go away from the centre of the loop reason being x- component will increase in magnitude as the distance increase. It will also be negative for large transmitter loop as the same magnetic flux line will also enter the loop which left previously for the less length. This will change the direction of z- component of Hs

- Justification for figure 4 :-

No magnetic field lines will pass through receiver coil when it is passed through pringle profile line.

- Justification for figure 6

No magnetic lines will pass through receiver when it is maneressed through pringle profile - line.