

Faraday's law lab report essay sample

Law



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B is the magnetic field at the location of the coil. A is the cross sectional area of the coil, and θ is the angle between the field and the area A . There is several different ways to create a changing flux through the coil. An easy way is to use a magnet moving near the coil to change B passing through the coil. Another way is to change B is to use a magnetic field B using another coil. If the current in the primary coil is changed, then the magnetic field through the secondary or pick up coil changes inducing a voltage.

Procedure: Start by setting up Logger pro and attaching the required equipment. A) Use a compass to determine the north. Change the sample rate on logger pro to 20-30 samples in 5 seconds. Collect data while moving a magnet toward the coil. Repeat what just was done but move the magnet away from the coil. Compare the differences of the two runs. Then run a magnet to and from the side of the coil and observe what happens. B) Attach a sine wave generator to a 200 turn coil. Insert an AC ammeter rated to at least 2 Amps into the circuit to monitor the current through the primary. Place the pickup coil at the center of the primary coil. Set sample rate to 1000 sample in 1 second. Collect several runs. Then turn the pick up coil sideways. Collect data and observe what happens.

Data

Graph 6. 1: this graph shows a sample of the data for procedure A.

Graph 6. 3: this graph shows the information collected for procedure B

Analysis:

Procedure A

In Procedure A when sliding the magnet from the north end it was consistent with the Faraday's law. This is true because the faster the magnet was moved the more the data spiked. As the magnet is moved from the south end little happened. This is also consistent with Faraday's law. Sliding the magnet from the side had no effect on the data.

Procedure B

The data we collected for this procedure created a sine wave. Using line fit on logger pro the following data was collected. The amplitude is .086. Angular frequency of voltage induced is solved for with the formula $2\pi f$. This value should be same to the sine wave generator's angular frequency. The sine wave generator's angular frequency is 377 rad/s compared to $2\pi f = 376.99$ rad/s. so there for our data was consistent. We used the following equation to solve for percent error:

$$\epsilon = \frac{400 \times 400 \times 0.035(2\pi 60) \times 4\pi \times 10^{-7} (0.686)^2 (10.5)}{0.086^2} \times 100\%$$

$$\epsilon = 0.0867\%$$

There was a small percent error, which is at .0867%. The peak current is square root of 2 times our irms value. This current is 0.968A. 0.158 is the minimum-induced emf when the coil is picked up. This makes the two coils are no longer perpendicular.

Conclusion:

The goals for the lab were met. The goal of the lab was to investigate the Faraday's law of induction. This was met by doing the experiment and then it

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was proved by the low percent error. The error that occurred could have been caused by faulty equipment and data collecting process.