A03-412P-Y02

Lenz's Law Experiment

Purpose

Discuss the direction of current which is generated by the relative motion of sliding a magnetic bar in and out of a coil of wire.

Theory

In 1833, Russian scientist, Heinrich Lenz, published his paper “Ueber die Bestimmung der Richtung durch elektodyanamische Vertheilung erregten galvanischen Ströme,” establishing Lenz’s law which is related to the direction of induced current. In 1847, scientist Hermann von Helmholtz proved that Lenz’s law was the consequence of conservation of energy.

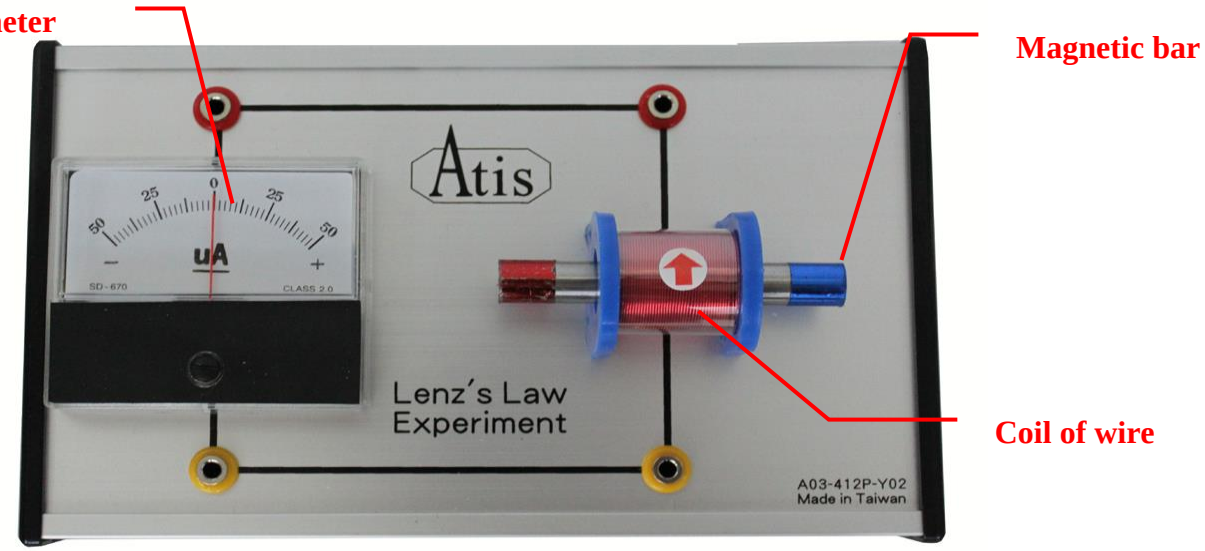
Lenz’s law:

When the magnetic flux changes, it induced current and creates a magnetic field which opposes the original magnetic field. Lenz’s law can identify the direction of EMF and induced current which are generated by electromagnetic induction.

Right-hand grip rule

If your right hand grip the imaginary wire, your thumb is the direction of current and your other fingers point the direction of magnetic field. In this experiment, we can use right-hand grip rule to find the directions of magnetic field and current.

Instruments



Procedure

When a magnetic bar slides in a coil, the coil generates induced current. The direction of induced current is different when the bar slides in and out of the coil. When we slide the magnetic bar to the coil from opposite direction, the coil can also generate induced current but the indicator of the galvanometer will point to opposite direction.

Use the experiment recording sheet to conduct experiment. Observe and record the direction of galvanometer's indicator. Use the right-hand grip rule to draw directions of induced current and its magnetic field.

Experimental data

Record experiment results:

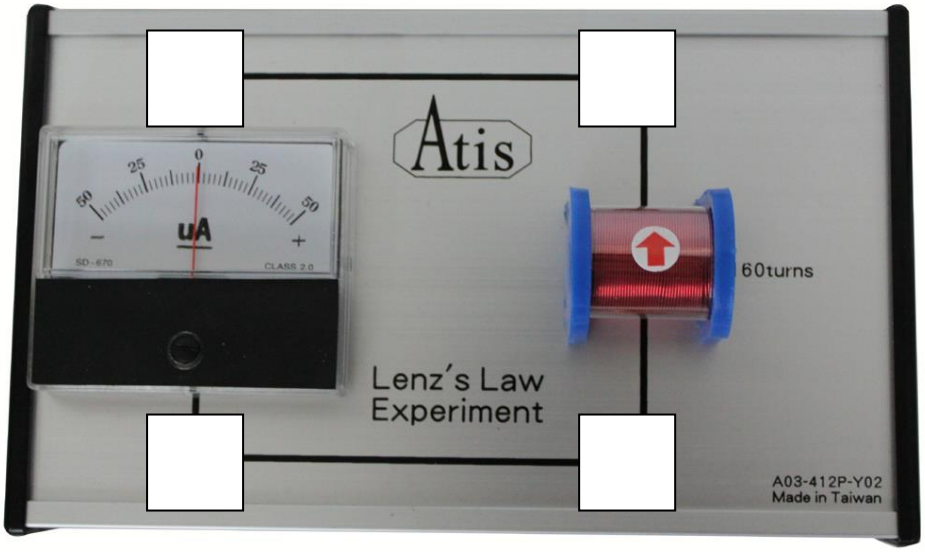
Experiment recording sheet- Magnetic bar at the right of the coil			
Pole of magnetic bar	Relative motion of magnetic bar and coil	Draw the magnetic field's direction of induced current	Direction of galvanometer's indicator (**Right:+** ； **Left:-**)
N pole of magnetic bar	In		
N pole of magnetic bar	Out		
S pole of magnetic bar	In		
S pole of magnetic bar	Out		

Experiment recording sheet- Magnetic bar at the left of the coil			
Pole of magnetic bar	Relative motion of magnetic bar and coil	Draw the magnetic field's direction of induced current	Direction of galvanometer's indicator (**Right:+** ； **Left:-**)

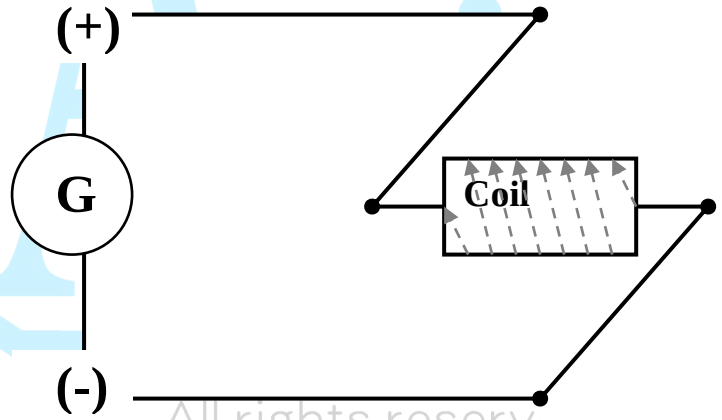
Questions and discussion

1. Please explain Lenz's law
ANS: The magnetic field's direction of induced current is always opposite to the magnetic field's direction of original magnets.

2. Indicate the connecting points of a galvanometer's positive and negative poles and two points of a coil.



ANS：



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