University of Al-Mustaqbal
College of Science
Department of Medical Physics

Magnetism

Practical Experiences

Second Stage

Study of the self-inductance coefficient

Lec 3

Asst. lec. Ali Jaafar

Asst. lec. Zainab jassim

Mohammed abdulzahra

Study of self-inductance and inductive potential in alternating current circuits

The goal of the experiment :

Finding the inductive will not have an alternating voltage source winding

Roads

Low voltage AC voltage source negligible primary

resistance inductor **Resistors box** ammeter for

alternating current

Tools :

1- power supply
2-Ameter
3-Voltmeter
4-Wires

Experience theory :

The output voltage of the voltage (V) and current (I) in the container circuit is the resistance to change in the voltage of the container circuit.

$$X_L = \frac{V_L}{I_L}$$

The inductive will is calculated from the following relations:- **from ohm's law**

Where W is the angular frequency and its unit is rad

L: coefficient of self-inductance of the inductor and its unit Henry (H)

F: Voltage frequency or frequency, frequency, Hz.

$$X_L = \omega L$$

Therefore, the inductive will can be found.

What does the induction reaction depend on:

The coefficient of self-induction of the inductor is directly proportional to it with the nucleus frequency constant, that is: XLαL

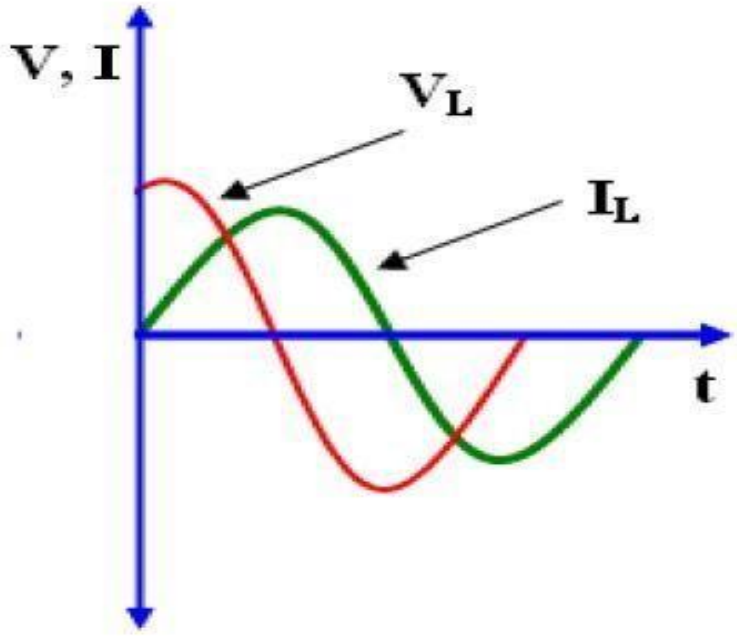
The angular frequency is W and is proportional to that of the inductance constant, i.e., XLαω

It can be shown that inductive reactance is measured by Blum

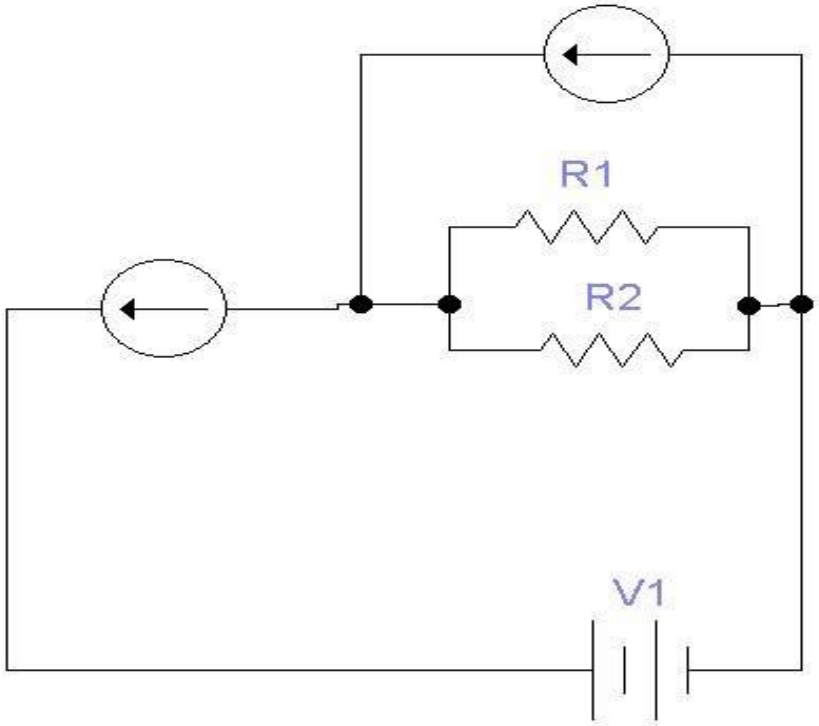
$X_L = 2\pi fL$

$$X_L = 2\pi f L$$

We note here the description of the relationship between the voltage and the current containing a pure inductor, which explains why the impedance of the coil is generated in the case of alternating current.



The method of work: -



We connect the electrical circuit as shown in the figure:-

*We start the voltage of the alternating source and record the value of the current passing through the ammeter and the value of the novelty difference on both ends of the coil using the voltmeter and insert the numbers in the table.

*Align the x axis and then calculate the value of the inductive will from the intrinsic equations.

*We find the theoretical value of the inductive regression and compare it with the original value and calculate the error rate:

Xm-x \ x * 100.

*We apply a sinusoidal voltage to a purely inductive inductor (that is, the basic resistance is zero.

*An electromotive force is generated.

*The AC source voltage is kept at a certain value throughout the experiment.

*The resistance achieved is 1 for each rate, recorded from its record of ammeters.

*Write your readings in the table.

* graphic graphs in the theoretical table.

* Record the frequency value in the source and then the value of the selfinduction coefficient.

The graph in voltages, the projected number, changes as it represents the maximum value of the voltage, the large number of voltages. Electrical energy and household and industrial operations by alternating current, alternating current, alternating current, electric current, electric current, alternative energy as needed by electrical transformers and represents the driving force (N) from the number of turns and turns in a uniform magnetic field and quickly..

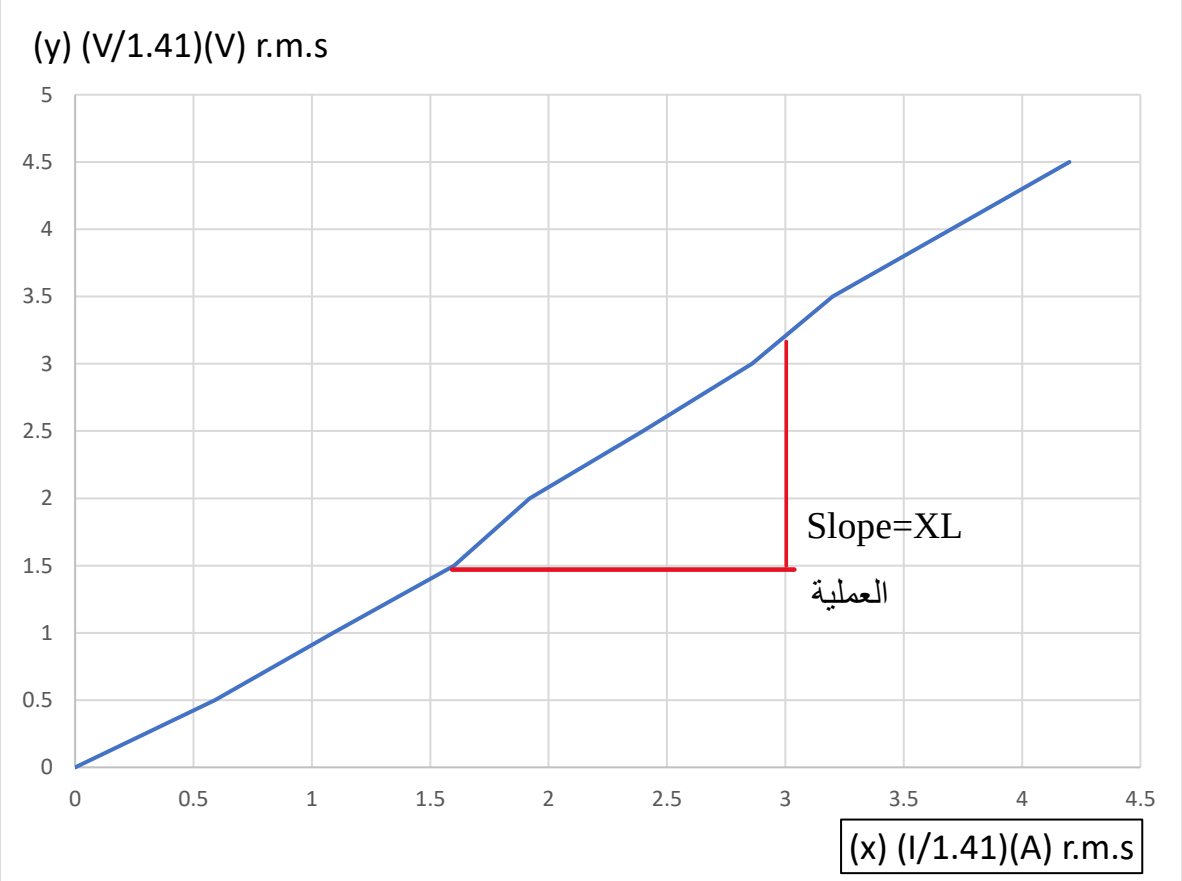
So does the case, and this constant current is connected to the current state.

Questions: -

1. Why is Hittite reaction not considered Ohmic resistance and does not obey Joule's law?
2. Why does the pure inductor not waste power in AC circuits?
3. Why is induction not generated in the case of direct current, as opposed to alternating current?
4. It is preferable to use alternating current in electrical circuits 4- Explain the visas in the Avometer.
5. Why is the resistance of a voltmeter higher than an ammeter?

F=50 Hz, L=2mH

V(v)	I(A)	(V/1.41) r.m.s	(I/1.41) r.m.s
0	0	0	0
0.5	0.59		
1	1.09		
1.5	1.6		
2	1.92		
2.5	2.4		
3	2.86		
3.5	3.2		
4	3.7		
4.5	4.2		



Discussion

1. The experiment studies:

A) Resistance in DC circuits
B) Self-inductance and inductive potential in AC circuits
C) Capacitance in RC circuits
D) Resonance in RLC circuits
E) Thermal conduction

2. The main goal of the experiment is to:
A) Measure capacitance
B) Find inductive reactance in AC circuits
C) Calculate electrical power
D) Measure voltage only
E) Study Joule heating

3. The unit of self-inductance (L) is:
A) Ohm (Ω)
B) Henry (H)
C) Volt (V)
D) Farad (F)
E) Ampere (A)

4. The unit of angular frequency (ω) is:
A) Hz
B) rad/s
C) N/m
D) T·m/A
E) s

5. The formula of inductive reactance is:
A) $XL = I \times R$
B) $XL = 2\pi fL$
C) $XL = L / f$
D) $XL = V \times I$
E) $XL = f / L$

6. Inductive reactance (XL) depends on:
A) Resistance and voltage
B) Frequency and self-inductance
C) Current and capacitance
D) Temperature only
E) Power factor

7. The relationship between XL and frequency (f) is:
A) Inversely proportional
B) Constant
C) Directly proportional
D) Logarithmic
E) No relation

8. The relationship between XL and L (inductance) is:
A) Inverse
B) Direct
C) Exponential
D) Logarithmic
E) None

9. Which of the following tools was NOT used in the experiment?
A) Power supply
B) Ammeter
C) Voltmeter
D) Resistance box
E) Oscilloscope

10. Why is inductive reactance not considered Ohmic resistance?
A) Because it changes direction with current
B) Because it does not follow Ohm's law
C) Because it stores energy instead of dissipating it
D) Because it depends on frequency
E) All of the above

11. Why is induction not generated in DC circuits?
A) Because voltage is high
B) Because current is constant (not changing)
C) Because resistance is zero
D) Because frequency is large
E) Because there's no power supply

12. The frequency used in the experiment was approximately:
A) 10 Hz
B) 25 Hz
C) 50 Hz
D) 100 Hz
E) 500 Hz

13. The inductance value used in the experiment was:
A) 2 H
B) 2 mH
C) 5 mH
D) 10 mH
E) 1 H

14. Which mathematical law is used to relate voltage, current, and inductive reactance?
A) Coulomb's law
B) Newton's law
C) Ohm's law
D) Faraday's law
E) Ampere's law

15. The slope of the line in the V–I graph represents:
A) Power
B) Reactance (XL)
C) Inductance (L)
D) Frequency (f)
E) Resistance (R)