



University College Dublin

An Coláiste Ollscoile, Baile Átha Cliath

PHYC20090 Electronics and Devices

Experiment No.7 Sinusoidal Response of the LCR
Resonant Circuit

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by Joana C.C. Adao (Student No. 23311051)

With Arminas A., Ananya L., Samuel S.



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Abstract

The aim of this experiment was to

1 Theory

1.1 LCR Circuits

An LCR circuit is made up of inductors (L), capacitors (C), and resistors (R), usually connected in series. Since all the components of the circuit are connected in series, equal amount of the current will flow through each element. [1]

A circuit containing these components, L, C, and R, can act as themselves individually at certain frequencies [2], §1.2.1. The LCR circuit can also magnify the voltages across the L, C, and R such that it is larger than the circuit's input voltage (ie. AC, Alternating Current) [2].

1.1.1 Inductance, Capacitance, Resistance

Inductance, capacitance, and resistance make up the basic parameters that can affect circuits up to some degree [3].

Inductance is a property of a conductor [4] and it's measured by its ability to store energy due to the magnetic field produced by the flow of current [3] and the voltage that is induced by the current's rate of change [4]. With AC (Alternating Current), the magnetic field produced fluctuates with the time-varying properties of AC power sources [3, 4].

The voltage is proportional to the rate of change of the current and this factor of proportionality is known as the inductance [4]. Coils of wire are most commonly used as the inductors in circuits as they amplify [3] the efficiency at which the magnetic field induces the voltage and current in the circuit. By coiling wire (solenoid) the magnetic field is concentrated and magnified at its centre, shown in Figure 1.

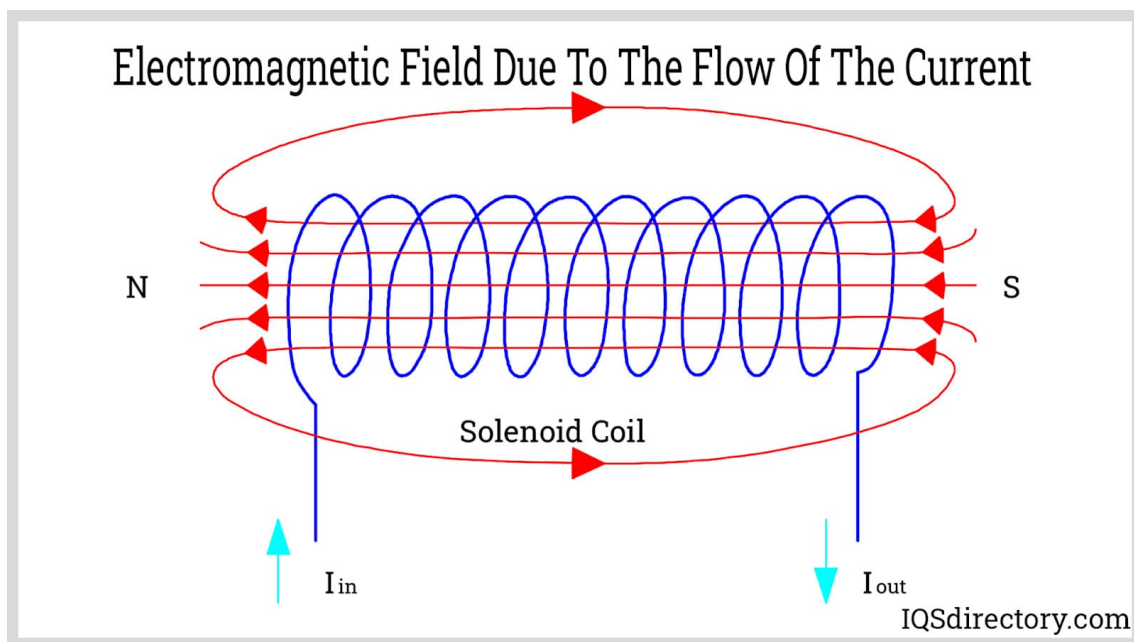


Figure 1: Electromagnetic Field Due to the Flow of the Current in a Solenoid

Capacitance

1.2 Wave Properties

1.2.1 Resonance

2 The Procedure

3 Results and Calculations

4 Conclusion

5 Expansion on the Experiment

References

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Appendix

Raw Data

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