

RESONANCE CIRCUIT

Resonance circuits play an important role in a variety of applications such as radio receivers or pulse generators.

- GOAL:** You practise manipulating an oscilloscope. You can describe and measure series resonance curves.
- SETUP:**
- Frequency generator and LCD oscilloscope
 - Coils, capacitors and resistors
 - Multimeters for resistance, capacitance and inductance measurements
- PROCEDURE:**
- A Using the multimeters determine the resistance, capacitance and inductance of the parts to be used in your circuit.
 - B Set up an LC series circuit with a coil, a capacitor and a resistor connected to the frequency generator. Calculate the expected resonance frequency for the circuit.
 - C Display the total voltage signal and the voltage across the resistor on the oscilloscope.
 - D Measure the amplitudes and the phase shift of both voltage signals for a minimum of ten different frequencies in a reasonable range around the resonance frequency.
 - E Repeat D for at least one different resistance.
 - F Determine the resonance frequency for a total of five different capacitances.
- INTERPRETATION:**
1. Calculate the impedance values from the voltage amplitudes measured in B and E, respectively. Plot the impedance vs. frequency graphs for the different resistances.
 2. In the same diagram plot the calculated graphs of the series impedance and the asymptotic approximations for low and high frequencies.
 3. Repeat steps 1 and 2 (analogously) for the phase shift.
 4. Check the relation between the circuit's capacitance and its resonance frequency.

REQUIREMENTS: If you do not write a report on this experiment, work at least on steps 1 and 2 of the interpretation. The complete interpretation is required for a report.

Hand in your report or interpretation and the lab journal by Friday, 1 October 2010.