ECE 209L - SECOND ORDER CIRCUITS - LAB 10
FREQUENCY RESPONSES OF RLC SERIES CIRCUITS

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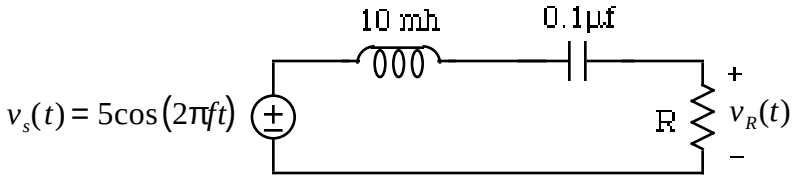
OBJECTIVE

The objective of this lab is to see how the amplitude of the sinusoidal steady state response of the following second order RLC series circuit varies as a function of frequency



PARTNER 1: R = 10K PARTNER 2: R = 20K

LAB

1. **Prelab** - Obtain and measure your resistor and capacitor values. Then compare your nominal and measured values. Put your results in a Table

2. Measure the value of the inductor supplied in the lab

3. Describe what you see happening to the amplitude of $v_R(t)$ as you increase the frequency of $v_s(t)$. Illustrate with graphs of $v_R(t)$

4. Explain why the amplitude of the sinusoidal steady state response of $v_R(t)$ behaves the way it does as you increase the frequency

5. Measure the resonance frequency f_p of the circuit - the frequency where the amplitude of $v_R(t)$ is maximum

6. Calculate the resonance frequency of your series RLC circuit with the equation $f_p = \dfrac{1}{2\pi\sqrt{LC}}$

7. Compare your measured and calculated values of the resonance frequency f_p

8. Measure $v_R(t)$ and then calculate $|G(j2\pi f)| = |V_R(j2\pi f)/\ V_S|$ at representative frequencies

9. **Prelab** - Draw the phasor circuit for your measured values (with L = 10 mh) and then calculate the transfer function $G(j\omega) = V_R(j\omega)/\ V_S$

10. **Prelab** - Make use of your equation in Problem (9) to obtain a Mathcad graph of the transfer function $|G(j2\pi f)| = |V_R(j2\pi f)/\ V_S|$ with f on a log scale

11. **Prelab** - Describe your frequency response graph in Problem (10). Is the circuit lowpass, highpass or bandpass

12. Add your data points to your graph in Problem (10). How well do your data points agree with the calculated values of the graph