LCR Circuit Analysis

Equipment

- Oscilloscope, function generator and variable resistors
- Various inductors, capacitors and connectors (BNC, banana and alligator)
- Optional: DMM and transformers

Objective

Physics Concepts

- Resonance

Experimental analysis

- Graph time varying functions, combine measurements to graph new quantities
- Match theory to experimental measurements
- Recognizing the uncertainty in measurements
- Use an oscilloscope to measure and compare time varying voltage signals

Lab Combine

- Setup a series LCR circuit driven by the function generator.
    - Record the values (with error) of your circuit elements.
- Pick a single driving frequency.
- Experimental:
    - Determine the peak voltage and phase angle for each circuit element.
    - Use an oscilloscope to determine the voltage (and phase shift) across the circuit element.
    - Remember that you need to make sure the grounds are common. This means you will need to switch around the order of circuit elements since you are measuring the voltage across the last element..
- Theoretical:
    - Determine the I(t) for the circuit.
    - Determine the expected V(t) for each circuit element.
    - Plot each voltage function.
    - Compare the theoretical to the experimental V(t) function.

Extended Lab Combine

- Replace the resistor with a transformer and resistor.
- Determine the effective load resistance experimentally and compare with theoretical expectation.

NOTE: A good combination for the LCR circuit would be C = .2 μF, L = 15 mH and R = 100 Ω to R = 2000 Ω. There are many other good combinations.