

ECE 209L - AVERAGE POWER OF PERIODIC SIGNALS - LAB 17 AVERAGE POWER OF SINUSOIDS

FALL 2003

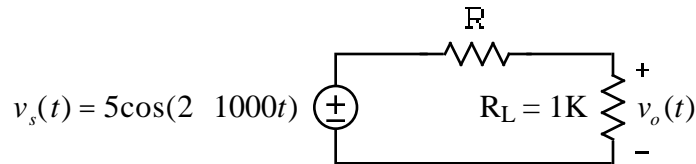
A.P. FELZER

OBJECTIVE

The objective of this experiment is to measure and make use of rms values of sinusoids

LAB

1. Given the following circuit



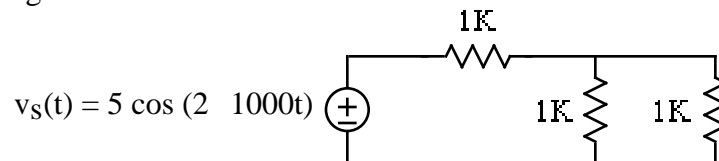
PARTNER 1: $R = 1K$ PARTNER 2: $R = 2K$

- a. **Prelab** - Obtain and measure your resistor values. Then compare your nominal and measured values. Put your results in a Table
- b. Sketch $v_o(t)$ as displayed on the scope
- c. Make use of your result in part (b) to obtain an equation for $v_o(t)$
- d. Make use of your result in part (c) to obtain an equation for $v_o^2(t)$
- e. Make use of your result in part (d) to obtain an expression for V_{rms} as follows

$$V_{rms} = \sqrt{\frac{1}{T} \int_T v_o^2(t) dt}$$

- f. Use your voltmeter to measure V_{rms} for $v_o(t)$
- g. Compare your values for V_{rms} in parts (e) and (f)
- h. Make use of your value for V_{rms} to calculate the average power P_{av} for R_L
- i. Experimentally determine how varying the frequency of the sinusoid affects the V_{rms} values in this **resistor** circuit

2. Given the following circuit



- a. **Prelab** - Obtain and measure your resistor values. Then compare your nominal and measured values. Put your results in a Table
- b. Use a voltmeter to measure V_{rms} and I_{rms} for each circuit element
- c. Make use of your results in part (b) to calculate the average power P_{av} of each circuit element - including the source
- d. Make use of your results in part (c) to verify that the average power being supplied by the source is equal to the sum of the powers being dissipated by the resistors