

# ECE 109L - SERIES AND PARALLEL CIRCUITS - LAB 12

## VOLTAGE AND CURRENT GAIN

FALL 2006

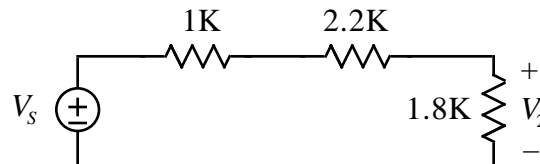
A.P. FELZER

### OBJECTIVE

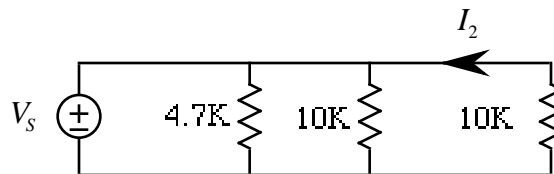
The objective of this lab is to calculate and measure the gains  $G$  in parallel and series circuits.

### LAB

1. Our objective in this first problem is to verify and make use of the fact that  $V_2$  is proportional to  $V_S$  in the following series circuit

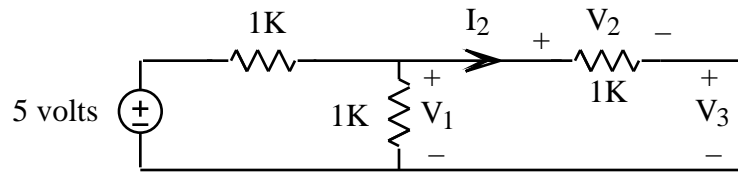


- a. Measure your resistor values. Compare with the nominal values
  - b. Measure  $V_2$  for a number of different positive and negative values of  $V_S$  including  $V_S = 0$
  - c. Make use of your data to graph  $V_2$  as a function of  $V_S$
  - d. Draw the best line you can through your data points and measure its slope
  - e. Make use of your measured slope to write an equation for  $V_2$  as a function of  $V_S$
  - f. Analyze the circuit to calculate the gain  $G = V_2/V_S$
  - g. Compare your measured and calculated value of  $G$
  - h. Make use of your measured value of  $G$  to predict  $V_2$  when  $V_S = 3.5$  volts
  - i. Measure  $V_2$  when  $V_S = 3.5$  volts
  - j. Compare your measured and calculated values of  $V_2$
2. Given the following parallel resistor circuit



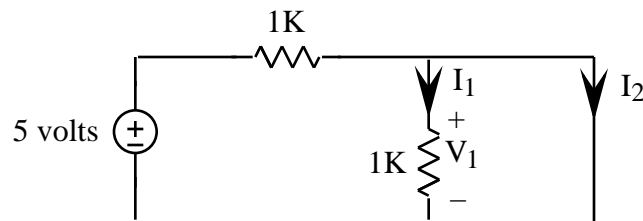
- a. Measure your resistor values. Compare with the nominal values
- b. Measure  $I_2$  for a number of different positive and negative values of  $V_S$  including  $V_S = 0$
- c. Make use of your data to graph  $I_2$  as a function of  $V_S$
- d. Draw the best line you can through your data points and measure its slope (remember that as always  $V_S$  is in volts and  $I_2$  in amps)
- e. Make use of your measured slope to write an equation for  $I_2$  as a function of  $V_S$
- f. Analyze the circuit for the gain  $G = I_2/V_S$
- g. Compare your measured and calculated value of  $G$
- h. Make use of your measured value of  $G$  to predict  $I_2$  when  $V_S = 3.5$  volts
- i. Measure  $I_2$  when  $V_S = 3.5$  volts
- j. Compare your measured and calculated values of  $I_2$

3. Given the following circuit



- PreLab** - Calculate  $V_1$ ,  $I_2$ ,  $V_2$  and  $V_3$
- Measure  $V_1$ ,  $I_2$ ,  $V_2$  and  $V_3$
- Compare your measured and calculated values  $V_1$ ,  $I_2$ ,  $V_2$  and  $V_3$
- Why is  $V_3 = V_1$

4. Given the following circuit



- PreLab** - Calculate  $I_1$ ,  $V_1$  and  $I_2$
- Measure  $I_1$ ,  $V_1$  and  $I_2$
- Compare your measured and calculated values of  $I_1$ ,  $V_1$  and  $I_2$
- Explain why  $I_1$  and  $V_1$  have the values they do