

ECE 109L - SERIES AND PARALLEL CIRCUITS - LAB 13

VOLTAGE AND CURRENT GAIN

SUMMER 2007

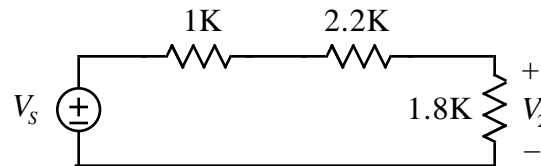
A.P. FELZER

OBJECTIVE

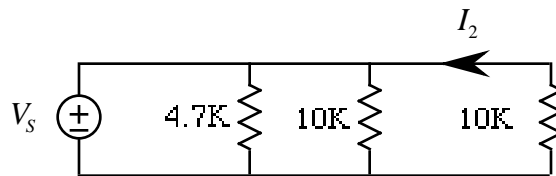
The objective of this lab is to calculate and measure the gains G in parallel and series circuits.

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



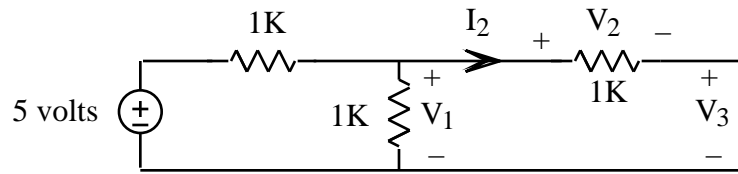
- a. Measure your resistor values. Compare with the nominal values
 - b. Measure V_2 for a number of different positive and negative values of V_s including $V_s = 0$
 - c. Make use of your data to graph V_2 as a function of V_s
 - d. Draw the best line you can through your data points and measure its slope G
 - e. Make use of your measured slope to write an equation for V_2 as a function of V_s
 - f. **PreLab** - Analyze the circuit to find 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. **PreLab** - Analyze the circuit for the gain $G = I_2/V_s$. You should get an equation like
$$I_2 = 2 \times 10^{-3} V_s$$
- 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

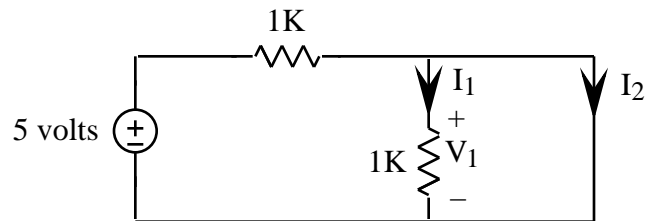
j. Compare your measured and calculated values of I_2

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