

# ECE 207L - FIRST ORDER RL CIRCUITS - LAB 19

## STEP RESPONSES OF FIRST ORDER RL CIRCUITS

FALL 2003

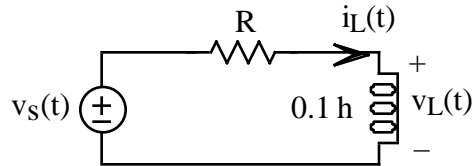
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### OBJECTIVE

The objective of this lab is to measure the step responses of first order RL circuits.

### LAB

1. Given the following first order RL circuit



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

- a. Measure your resistor and inductor values. Compare with nominal values
- b. Sketch what you expect the step responses of  $i_L(t)$  and  $v_L(t)$  to look like. Make sure your pulse train input has pulses that are ON long enough for the circuit to reach steady state and OFF long enough for  $i_L(t)$  to return to zero.
- c. Sketch the step responses of  $i_L(t)$  and  $v_L(t)$  from what you observe on the scope
- d. Explain any differences between your predictions and observations of  $i_L(t)$  and  $v_L(t)$  in parts (b) and (c)
- e. Make use of your graph in part (c) to write an equation for  $i_L(t)$  as a function of
- f. Measure  $i_L(t)$  at a particular time  $t$ .
- g. Make use of your equation in part (e) and your measurement in part (f) to calculate the circuit's time constant
- h. Calculate the time constant using the equation  $\tau = L/R$
- i. Compare your calculated and measured values of  $\tau$  in parts (g) and (h)