# ECE 211 Fall 2003 PSpice Lab 3

(due 12/10/03 at the beginning of discussion)

## **Objectives:**

In this PSpice lab, you will learn how to analyze simple transient circuits. This will include creating the circuit schematics, setting up the simulations, specifying the initial conditions, creating transient sources, and plotting both simple (voltage, current) and calculated (power) results. The first two problems are homogeneous second-order circuits from homework seven. The third problem is new but you are given a result to check against.

## **Required Output:**

- For each problem: A labeled (just the component values) schematic print out for each circuit. Output files are <u>NOT</u> required.
- Problem 1: A graph of the transient current response and the transient voltage responses across each element (R,L,C). Four graphs. State what case the transient response falls into, under-damped or over-damped.
- Problem 2: A graph of the transient voltage response and the transient current responses for each element (R,L,C). Four graphs. State what case the transient response falls into, under-damped or over-damped.
- Problem 3: A graph of the transient current response and the transient voltage responses across each element (V1,R,L,C). Five graphs. A graph of the transient power for each element (V1,R,L,C). Four graphs. Repeat for the second case.

## Problem 1



For the circuit above (homework 7, problem 2A): Given that at time zero\*, the current I is 1A and the capacitor voltage is 0V, simulate the circuit response from 0ms to 10ms for R=20R.

## Problem 2



For the circuit above (homework 7, problem 2B): Given that at time zero\*, the inductor current is 0A and the capacitor voltage is 10V, simulate the circuit response from 0ms to 10ms for R=10R.

#### Problem 3



For the above circuit:

- 1. Set V1 to be 0V from 0ms-10ms; 10V from 10ms to 30ms; -10V from 30ms-50ms; 0V from 50ms onwards\*\*.
- 2. Plot V1 to check it, then simulate the circuit from 0ms to 200ms. The current should be as shown below. Ask for help if you don't get this result.



- 3. Change R1 to 50R and run the simulation again.
- \* For help setting initial conditions for the circuits in problems 1 and 2, refer to tutorial IIb on the class website.
- \*\* For help configuring V1, refer to the tutorial IIb on the class website.

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