EGR 261
Signals & Systems
File: Parametric & Transient - Second Order.opj

Parametric and Transient Analysis of a Second-Order Circuit

Purpose: Graph the capacitor voltage as the resistance varies from 15 ohms (underdamped circuit)
to 150 ohms (overdamped circuit)

Analysis: A transient analysis from 0 to 5RC is performed using the largest value of R (150). So 5RC = 750us.
A parametric analysis is used to vary R from 15 to 150 in steps of 15 ohms.

TCLOSE = 0

1 U1 2

R1
RSWEEP
SET = 1

L1
1mH
IC = 0

>
≪ C

10Vdc V1 + −

1uF   C1
IC = 0

0
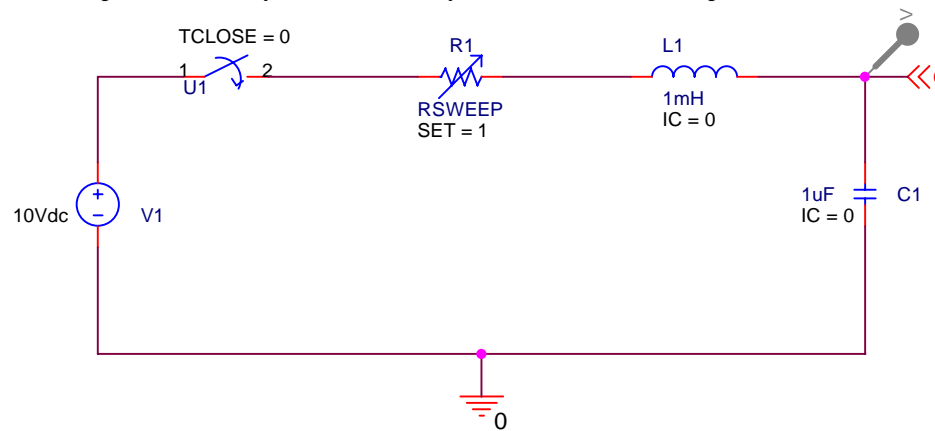
PARAMETERS:
RSWEEP = 15

Place the part PARAM in the
schematic from the SPECIAL library.

Edit the properties of PARAM and ADD a
property named RSWEEP (for example).
Right-click on RSWEEP (while still in the
property editor) and change the DISPLAY
FORMAT so that both the name and the
value will be displayed. Go back to the
schematic and double-click on RSWEEP and
give it the value 15 (for example).

Note that the part R_var from the ANALOG library was used for the variable
resistor. A regular resistor (part R) would work as well.

Be sure to change the variable resistor's attribute SET to 1 or else the resistor
values will be multiplied by the default SET value of 0.5.

An OFFPAGE symbol was used to label the node as C above the capacitor.
A voltage marker was added so that V(C) will be automatically graphed after
analysis.

The part Sw_tClose from the EVAL library was used to model the closing switch.

(A) Capacitor Voltage as R varies from 15 to 150 ohms

R = 15 ohms (underdamped)

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R = 150 ohms (overdamped)

□ ◇ ▽ △ ○ + × ⅄ Y * V(C)

Time

Simulation Settings - Parametric & Transient

Tabs: General | Analysis | Include Files | Libraries | Stimulus | Options | Data Collection | Probe Window

Analysis type:
Time Domain (Transient)

Options:
- ☑ General Settings
- ☐ Monte Carlo/Worst Case
- ☑ Parametric Sweep
- ☐ Temperature (Sweep)
- ☐ Save Bias Point
- ☐ Load Bias Point

Run to time: 750us seconds (TSTOP)

Start saving data after: 0 seconds

Transient options

Maximum step size: 750ns seconds

☐ Skip the initial transient bias point calculation (SKIPBP)

Output File Options...

OK   Cancel   Apply   Help