DMCS

Computer Aided Design of Electronic Circuits

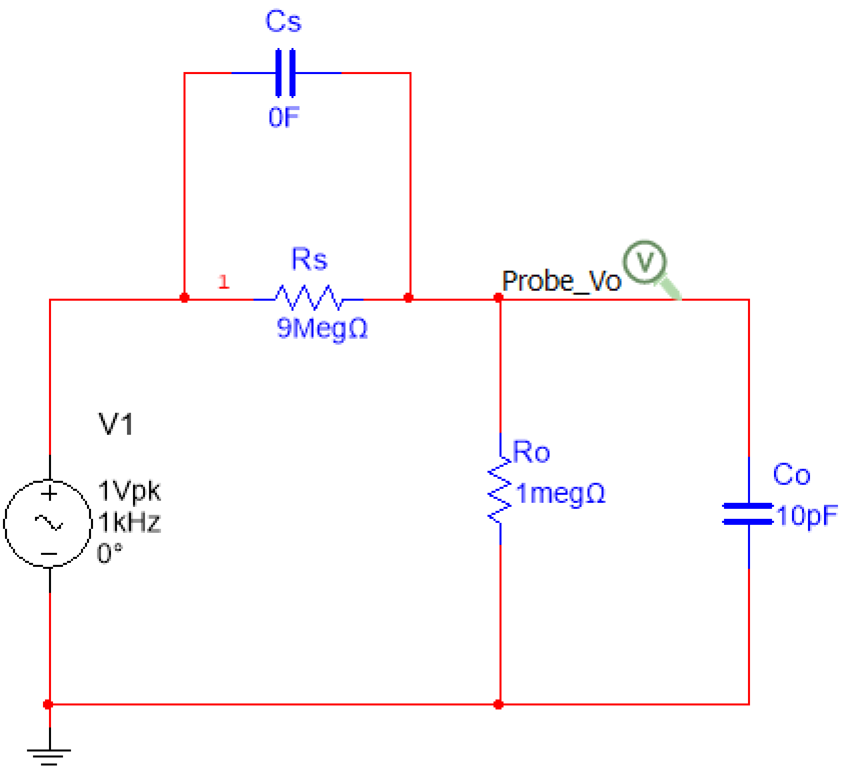
REPORT 1

EXERCISE 1 – RC CIRCUIT

Joanna Klinkiewicz

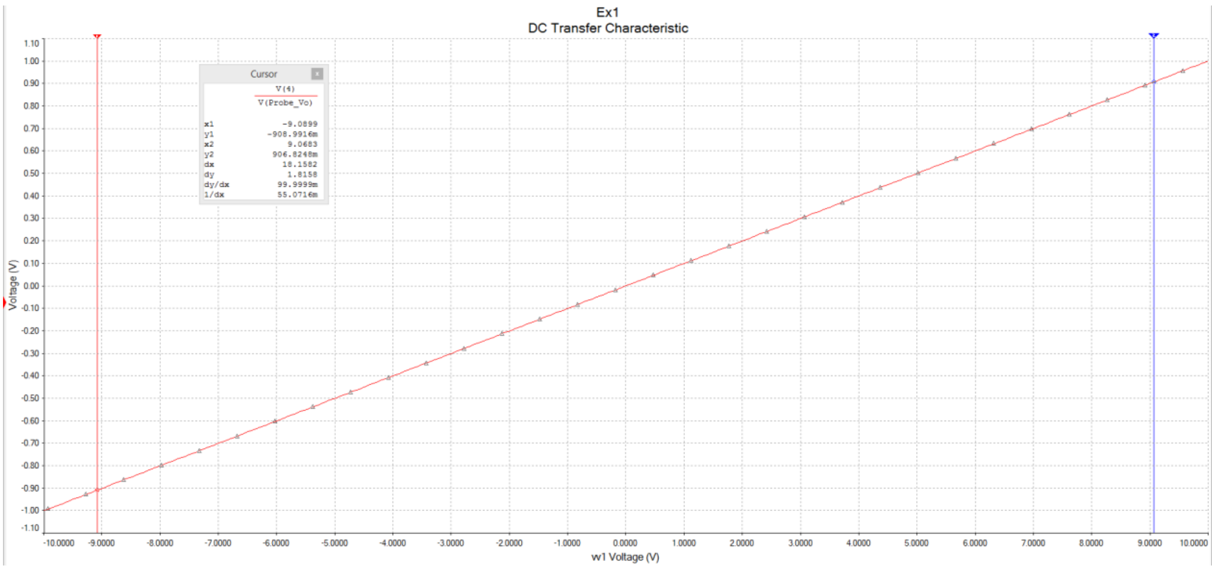
190097

IFE, TCS 2016



Plot 1. Circuit scheme.

DC ANALYSIS



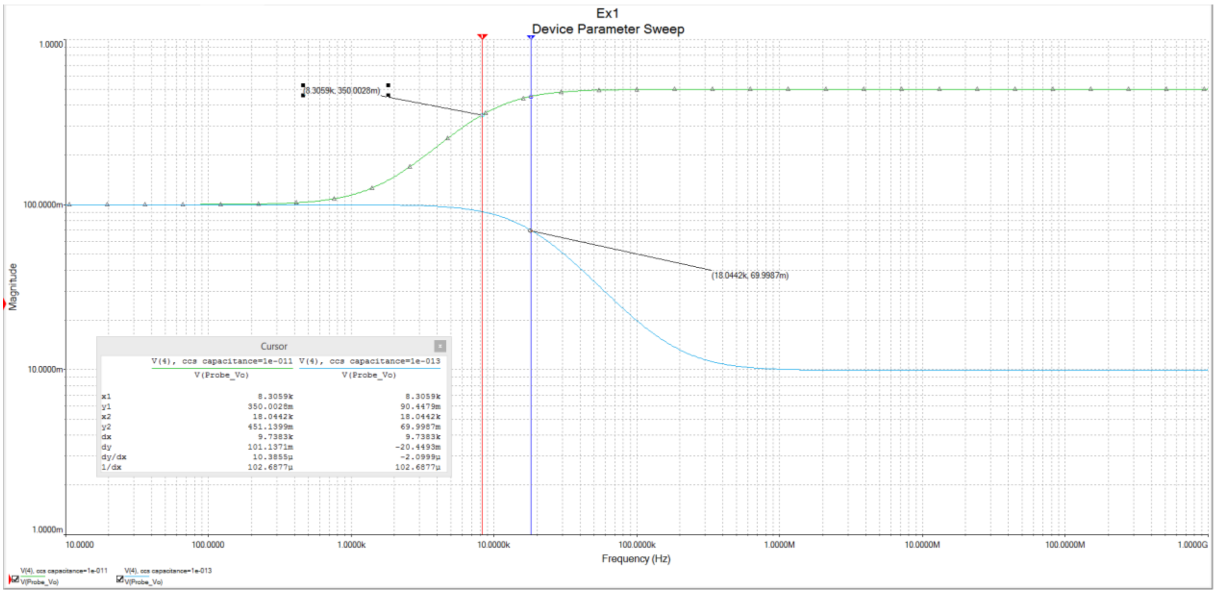
Plot 2. V_{out} as a function of V_{in}.

Voltage gain was determined graphically from the plot using cursors.

$V_{gain}=V_{out}/V_{in}$

V_{gain}=99.999m therefore V_{gain}=0.1

AC ANALYSIS



Plot 3. Ac magnitude analysis for both Cs=0.1 pF (blue curve) and Cs=10pF (green curve).

Capacitance Cs has an impact on magnitude analysis. The biggest Cs, the smallest cutoff frequency.

The decrease of the signal voltage to its halt value is at the -3dB and thus it specifies cutoff frequency F_{cut} that is:

0.707*100mV=70,7mV
$F_{cut=}$ 18 kHz for circuit with Cs=0.1pF

0.707*500mV=353,3mV
$F_{cut=}$8.4 kHz for circuit with Cs=10pF

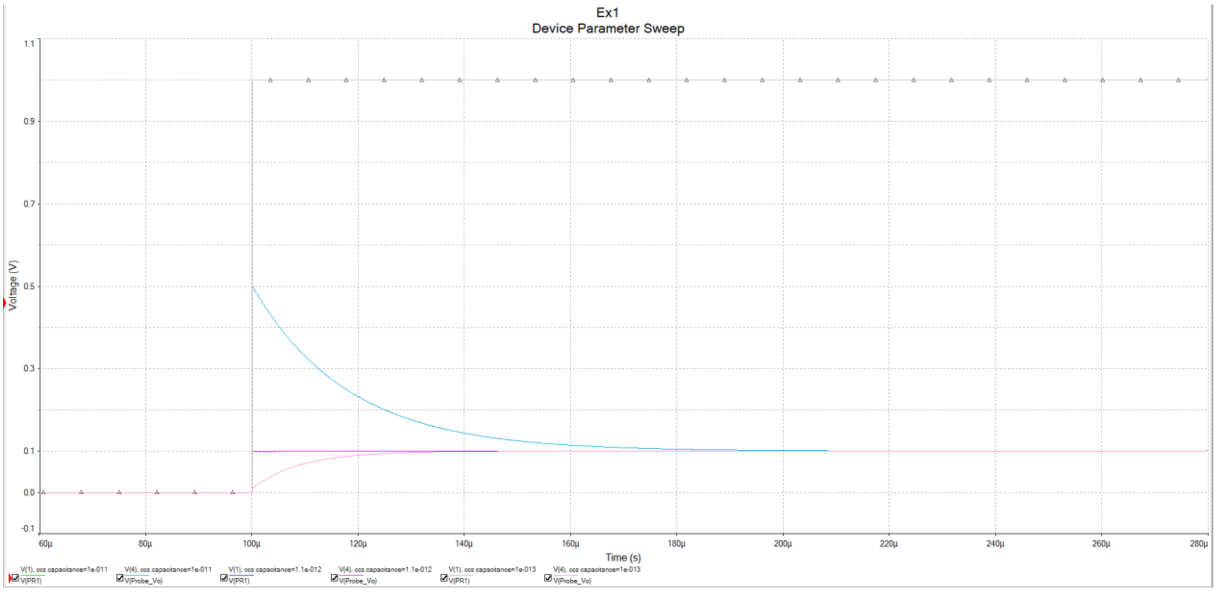
PROJECT I

Depending on Cs value the circuit characteristic might change from low pass to high pass filter. Having exact value of Cs, the characteristic will be flat.

Cs*Rs=Co*Ro, therefore Cs= Co*Ro/Rs

Cs= 10pF*1M Ω / 9MΩ
Cs=1,1pF

Having Cs=1,1pF the characteristic will be flat.



Plot 4.Transient analysis - characteristics of Cs 0,1 pF (orange curve), 1,1pF (pink curve) 10pF (blue curve).

PROJECT II

In order to get the division ratio 1:50 one need to calculate:

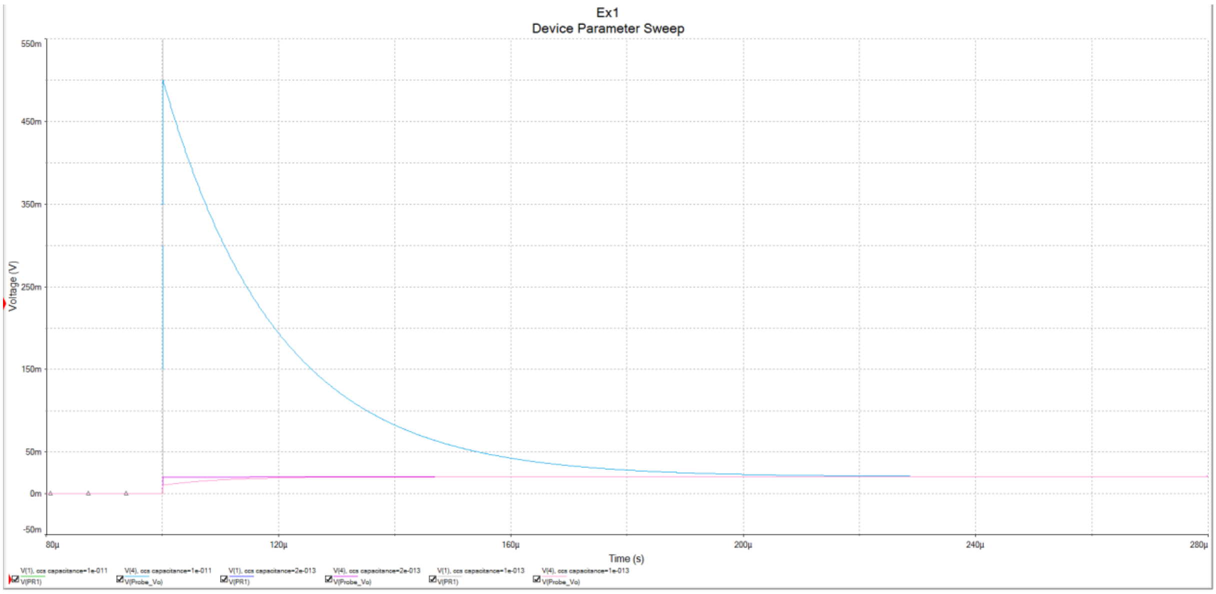
Cs*Rs=Co*Ro , where from the ratio we know that Rs=49MΩ

Cs=Co*Ro / Rs

Cs=10pF*1MΩ / 49MΩ

Optimal values: Cs=0,2pF and Rs=49MΩ

The prof (flat analysis – pink curve) can be seen below.



Plot 5. Transient analysis - characteristics for Rs=49MΩ and Cs 0,1 pF (orange curve), 0,2pF (pink curve) 10pF (blue curve).