# SMDP Instructional Enhancement Programme: 13-24 Nov. 2006

Nagendra Krishnapura (nagendra@iitm.ac.in)

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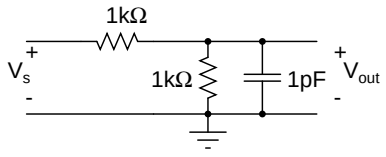


Figure 1:

1. (a) Compute the transfer function $V_{out}(s)/V_{in}(s)$ of the circuit in Fig. 1 analytically.

   (b) Simulate the circuit from 10 MHz to 10 GHz and plot a) the magnitude and phase response, b) Input referred noise spectral density, c) output noise spectral density.

   (c) Find the 3dB bandwidth of the circuit.

   (d) Run a transient simulation with a 0.5 V peak sinusoid at the 3 dB bandwidth and plot the output. Are the magnitude and phase consistent with what was computed in (b)?

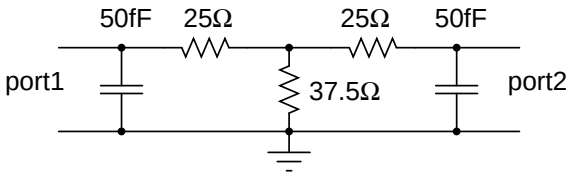


Figure 2:

2. Simulate and plot the s-parameters of the circuit in Fig. 2 in a 50 Ω system.

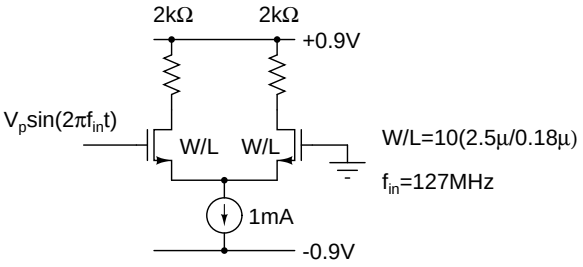


Figure 3:

3. (a) Plot the magnitude and phase response of the circuit in Fig. 3.

   (b) Plot the input referred and output noise spectral densities

   (c) Simulate the circuit with a 127 MHz sinusoid with peak values of 50 mV and 200 mV. Take the DFT of the output with 1024 points and determine the 2nd and 3rd harmonic distortion in each case.

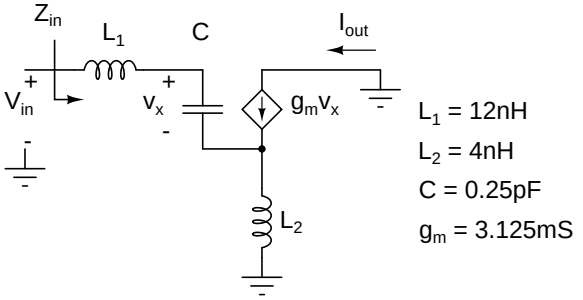


Figure 4:

4. (a) Compute the input impedance $Z_{in}(s)$ of the circuit in Fig. 1 analytically. Com-

pute the frequency $f_0$ at which the input impedance is real and the input impedance at $f_0$. Calculate $I_{out}(s)/V_{in}(s)$.

(b) From ac simulations determine the frequency at which the input impedance is real, and the input impedance at that frequency. Compare the answers with analytical calculations. Simulate the frequency response $I_{out}(s)/V_{in}(s)$.