

EECS 170LC Laboratory Assignment #3 *Measurement*

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Overview

In this lab we measure the behavior of a differential amplifier.

Measurement Assignment

You will be using the CD4007 MOSFET transistors provided to you by your lab TA.

1. Construct the circuit shown in Fig. 1 using the resistor values found in the simulation assignment from HW #4. Before applying the signal generator, measure all node voltages and transistor drain currents. Verify that the transistors are biased in the saturation region and that the operating point is close to that found from your simulations. In order to set the appropriate I_{SS} you may need to adjust resistor R_{REF} ; you may also need to adjust one of the resistors connected to V_{in-} in order to keep the output dc operating points at the same level. Your lab TA will show you how to do this.
2. Using the signal generator, apply to v_{in} a sine wave, centered at 0 V, with 100 mV amplitude and 1 MHz frequency. Observe on the oscilloscope the signals V_{out+} , V_{out-} , and $(V_{out+} - V_{out-})$ and note their amplitudes.

Explain this result based on the values of A_{dm} and A_{cm} derived from your simulation. (Hint: Determine the differential-mode and common-mode components of the input signal.)

3. Increase the input amplitude until you observe noticeable distortion in the output signals. Describe your observation of these signals, including the voltage ranges of V_{out+} , V_{out-} , and $(V_{out+} - V_{out-})$.

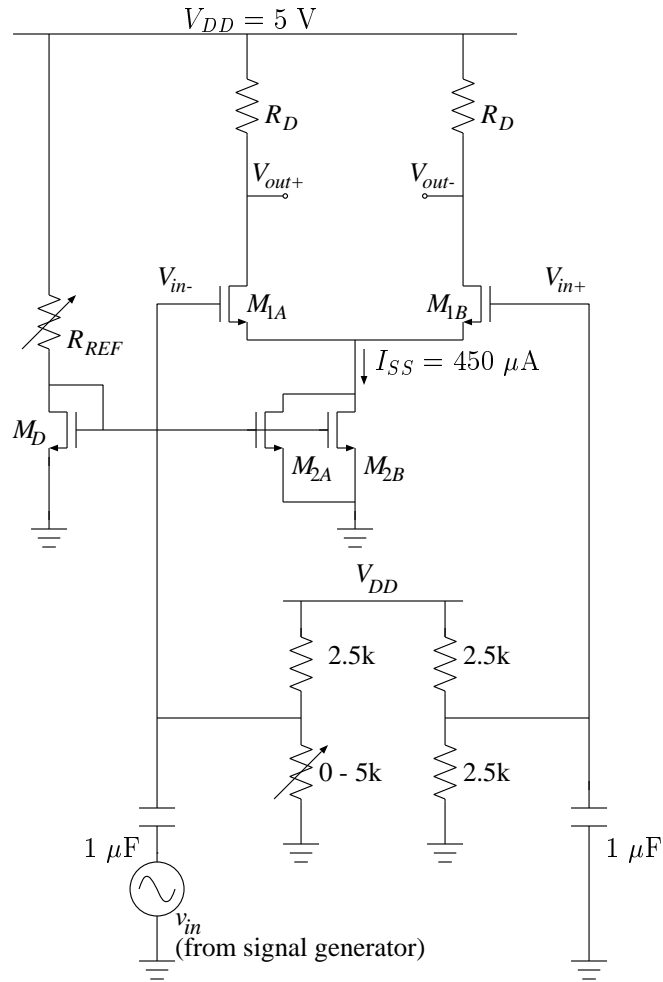


Figure 1: