

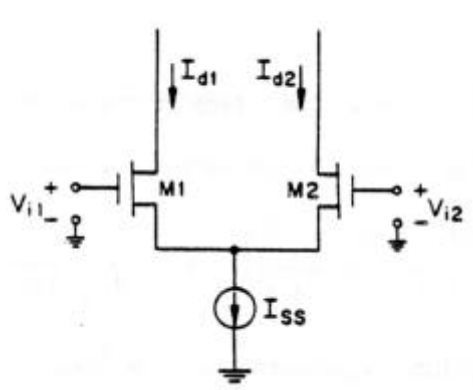
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Homework 10
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EECS 247
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The differential output current for an MOS source-coupled is given by:



$$\Delta I_d = I_{ss} \left[\frac{\Delta v_i}{(V_{gs} - V_{th})_{M1,2}} \right] \left\{ 1 - \frac{1}{4} \left[\frac{\Delta v_i}{(V_{gs} - V_{th})_{M1,2}} \right]^2 \right\}^{1/2}$$

$$\Delta v_i = v_{i1} - v_{i2}$$

By using the series expansion for $(1-x^2)^{1/2}$, express the differential output current as a function of input voltage:

$$Y = a_1 X + a_2 X^2 + a_3 X^3 + \dots$$

1. Find an expression for HD3 as a function of input voltage. Compute the input voltage for which HD3=1% assuming $V_{gs}-V_{th}=1V$
2. Find an expression for IM3. Compute the input voltage where IM3=1% assuming $V_{gs}-V_{th}=1V$
3. Compute IIP3 (input-referred 3rd order intercept point) in dBm (referred to 50Ω)