ECE 614 - Lecture 4

* Resistive averaging CM-detector
* dual diff-pair based CM-detector
Two-stage FD opamp

Two options:
1. We use a single point of control
2. Two separate CMFB loops for each of the nodes
\[ V_{\text{ref1}} = ?? \]

\[ \text{Dual Diff-pair} \]

\[ \Rightarrow V_{\text{ref1}} \text{ biases the 2nd gain stage} \]

\[ \Rightarrow V_{\text{bias2}} \]

\[ \Rightarrow \text{Size CMFB1 s.t. there is no systematic offset.} \]
Control M6, M8 s.t. the current is equal to \( I_{M5} \) & \( I_{M7} \).
Single-loop CMFB:

\[ V_{\text{cmfb}} \]

feedback loop adjusts DC level here

\[ I_{f/2} \]

\[ V_{op} \]

\[ V_{cm/\text{out}} \]
CM picture

VcmFB

x 3 low-frequency poles

L, complex compensation

x How to get rid of this 3-pole situation

Kill the gain of this core Amp?
\[ g_c = \frac{1}{2} \left( \frac{g_{m1}}{g_{m3}} \right) \leq -1 \]

- Can use the differential path \( C_c \) for compensating the CMFB loop itself.