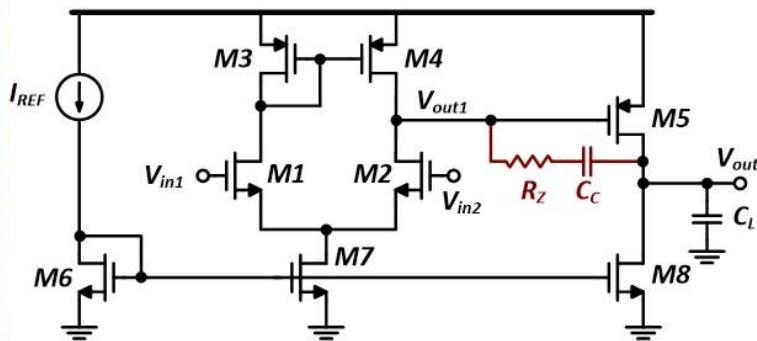


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Thursday Analog Quiz



Assume all transistors are biased in SI and the square-law is valid. If IREF is halved ($\times 0.5$), what happens to the PM (phase margin)?

As I_{REF} is halved, so I_{D2} then $\mathcal{I}_{m2} \times \frac{1}{\sqrt{2}}$

so I_{D5} then $\mathcal{I}_{m5} \times \frac{1}{\sqrt{2}}$

as $\frac{\frac{1}{\sqrt{2}}}{\frac{1}{\sqrt{2}}} = 1 \Rightarrow$ then PM will not change.

This is a 2-poles system

First pole:

$$\omega_{p1} = \frac{1}{C_C R_{out1}} = \frac{Gm_1}{C_C} = \frac{\mathcal{I}_{m2}}{C_C}$$

$$\omega_{p2} = \frac{1}{C_L R_{out2}} = \frac{Gm_2}{C_L} = \frac{\mathcal{I}_{m5}}{C_L}$$

$$PM = 90 - \tan^{-1} \left(\frac{\omega_{p1}}{\omega_{p2}} \right)$$