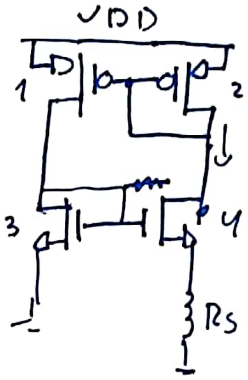

$I_{D3} \ne I_{D4}$

$I_{D4} = I_{D3} K$

$\frac{I_{D3}}{I_{D4}} = \frac{1}{K}$

$V_{gs3} = V_{gs4} + I_{D4} R_S$

assuming $V_{th3} = V_{th4}$

$\sqrt{\frac{I_{D3} \times 2}{u_n C_{ox} \frac{W}{L}_3}} + V_{th3} = \sqrt{\frac{2 I_{D4}}{u_n C_{ox} \frac{W}{L}_4}} \times (1 + R_S) + V_{th4}$

$$\frac{\sqrt{\frac{I_{D3} \times 2}{u_n C_{ox} \frac{W}{L}_3}}}{\sqrt{\frac{2 I_{D4}}{u_n C_{ox} \frac{W}{L}_4}}} = (1 + R_S)$$

$$\frac{\frac{I_{D3}}{W/L3}}{\frac{I_{D4}}{W/L4}} = \sqrt{(1+R_S)} = \frac{1}{K} = \frac{W/L4}{W/L3} \sqrt{(1+R_S)}$$

$$K = \frac{W/L3}{W/L4} \frac{1}{\sqrt{(1+R_S)}}$$

$I_{D4} = I_{D3} \times K$

Vout VREF

$V_{SD2} = V_{DD} - V_{DS4} - I_{D4} R_S$

2 $I_{D4} = \frac{W}{L}_2 C_{ox} u_p (V_{SD2} - V_{th})^2 \propto 2$

The relation but with an increase in

I

$\boxed{\dfrac{I_{D3}}{I_{D4}}} = \boxed{k} \rightarrow$ This ratio is controlled

But I_{D3} controls ~~Vout~~ Vref

If we Increase $\frac{W}{L}$ ~~si~~ of $\frac{W}{L}3 \rightarrow$ Vref will Decrease and k will increase ~~Becau~~ and I_{D4} will Increase