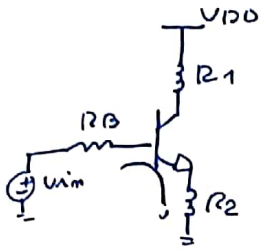
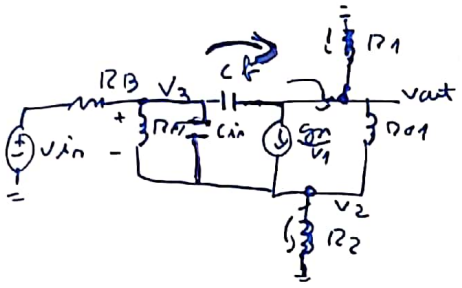
Degenerated Stage Emissor



3 nodes

$V_{23} - V_{12} = V_1$

II model



Input Impedance

$$\frac{V_{in}}{I_{in}} = R_B + r_\pi + R_2$$

Transconductance

$$I_O = g_m V_1$$

$$I_B = \frac{V_{in}}{R_B + r_\pi + R_2}$$

$$V_1 = I_B r_\pi$$

$$V_1 = \frac{V_{in}}{R_B + r_\pi + R_2} \times r_\pi$$

$$I_O = \frac{g_m r_\pi V_{in}}{r_B + r_\pi + R_2}$$

$$\frac{I_O}{V_{in}} = \frac{g_m r_\pi}{r_B + r_\pi + R_2}$$

$$A_V$$

$$V_2 = \frac{R_2 V_{in}}{r_B + r_\pi + R_2}$$

$$V_1 = \frac{V_{in} r_\pi}{r_B + r_\pi + R_2}$$

$$\frac{V_{out}}{r_{o1}} + \frac{V_{out} - V_2}{r_{o1}} + g_m V_1 = 0$$

$$V_{out}\left(\frac{1}{r_1} + \frac{1}{r_{o1}}\right) + V_{in}\left(\frac{r_\pi g_m}{R_B + r_\pi + R_2} - \frac{R_2 V_{in}}{r_B + r_\pi + R_2}\right)$$

$V_1 = V_3 - V_2$

$\Delta V(\Delta)$

$$(V_3 - V_2)\left(\frac{C_{fin}\Delta n_1 + 1}{n_1}\right) + \frac{(V_3 - V_{in})}{R_B} + C_{fs}(V_3 - V_{out})$$

$$V_3 = \frac{\frac{V_2 C_{fin}\Delta n_1 + 1}{n_1} + \frac{V_{in}}{R_b} + V_{out} C_{fs}}{\frac{C_{fin}\Delta n_1 + 1}{n_1} + \frac{(V_3 - V_{in})}{n_B} + C_{fs}(V_3 - V_{out})}$$

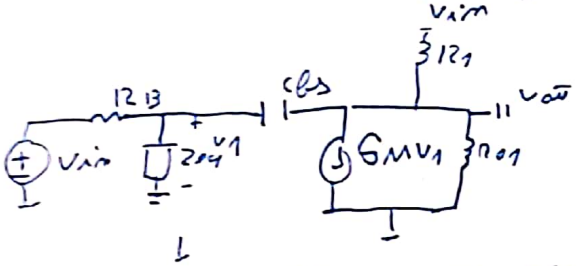
$$\frac{V_2}{R_2} + \frac{V_2 - V_{out}}{n_{01}} - g_{m1}\underbrace{(V_3 - V_2)}_{V_1} + (V_2 - V_3)\frac{(n_1 n_2 C_{fin}\Delta + 1)}{n_1} = 0$$

$$V_2 = \frac{\frac{V_{out}}{n_{01}} + g_{m1}V_3 + V_3\frac{(n_1 n_2 C_{fsin} + 1)}{n_1}}{\frac{1}{n_{02}} + \frac{1}{n_{01}} + g_{m1} + \frac{n_1 n_2 C_{fsin} + 1}{n_1}}$$

Can't reach an esc1ression To solve

very complicated

Aproximated version $\frac{I_o}{V_{in}} = \frac{g_m Z_{o4}}{r_B + r Z_{o4} + r_2} = G_M V_1$ $\quad Z_{o4} \simeq \frac{r_o}{r_o C_{in} s + 1}$



"new representation" of the circuit

same thing as the the CE resistance

But now g_m is directly dependent on θ_m

But switch g_{m1} with G_{M1}

The rest is equal to the CE stage resistance But with an g_m Dependent on Frequency