

Admitančni parametri:

$$\begin{aligned}i_1 &= y_{11}u_1 + y_{12}u_2 \\i_2 &= y_{21}u_1 + y_{22}u_2 \\y_{11} &= \frac{1}{h_{11}}, \quad y_{12} = -\frac{h_{12}}{h_{11}} \\y_{21} &= \frac{h_{21}}{h_{11}}, \quad y_{22} = \frac{D_h}{h_{11}}\end{aligned}$$

$$A_u = -\frac{y_{21}}{y_{22} + Y_L}, \quad A_i = \frac{y_{21}}{y_{11} + Z_L D_y}, \quad Y_{in} = y_{11} - \frac{y_{12}y_{21}}{y_{22} + Y_L}, \quad Y_{out} = y_{22} - \frac{y_{12}y_{21}}{y_{11} + Y_{src}}$$

Hibridni parametri:

$$\begin{aligned}u_1 &= h_{11}i_1 + h_{12}u_2 \\i_2 &= h_{21}i_1 + h_{22}u_2 \\h_{11} &= \frac{1}{y_{11}}, \quad h_{12} = -\frac{y_{12}}{y_{11}} \\h_{21} &= \frac{y_{21}}{y_{11}}, \quad h_{22} = \frac{D_y}{y_{11}}\end{aligned}$$

NMOS:

za $u_{GS} - U_T > 0$ in $u_{DS} > u_{GS} - U_T$:

$$\begin{aligned}i_D &= \frac{1}{2}K(u_{GS} - U_T)^2(1 + \lambda u_{DS}) \\g_{21} &= \frac{2I_D}{U_{GS} - U_T}, \quad g_{22} = \frac{\lambda I_D}{1 + \lambda U_{DS}}\end{aligned}$$

PMOS:

za $-u_{GS} - U_T > 0$ in $-u_{DS} > -u_{GS} - U_T$:

$$\begin{aligned}-i_D &= \frac{1}{2}K(-u_{GS} - U_T)^2(1 + \lambda(-u_{DS})) \\g_{21} &= \frac{2(-I_D)}{-U_{GS} - U_T}, \quad g_{22} = \frac{\lambda(-I_D)}{1 + \lambda(-U_{DS})}\end{aligned}$$

NPN:

v aktivnem področju:

$$\begin{aligned}g_{11} &= \frac{I_B}{V_T}, \quad g_{21} = \frac{I_C}{V_T}, \\g_{22} &= \frac{I_C}{U_{CE} + V_{AF}} \\ \frac{g_{21}}{g_{11}} &= \beta = \beta_F(1 + \frac{U_{CE}}{V_{AF}})\end{aligned}$$

PNP:

v aktivnem področju:

$$\begin{aligned}g_{11} &= -\frac{I_B}{V_T}, \quad g_{21} = -\frac{I_C}{V_T}, \\g_{22} &= \frac{-I_C}{-U_{CE} + V_{AF}} \\ \frac{g_{21}}{g_{11}} &= \beta = \beta_F(1 + \frac{-U_{CE}}{V_{AF}})\end{aligned}$$

RC člen - mejna frekvenca: $f_{-3dB} = \frac{1}{2\pi\tau} = \frac{1}{2\pi R_{eq}C}$ Miller-jev pojav (preslikava impedance med vhom in izhodom tranzistorja z napetostnim ojačenjem A_0 na vhod tranzistorja):

$$Z_{M,vhod} = \frac{Z_{vhod-izhod}}{1-A_0} \Rightarrow \text{za skupni emitor: } C_M = (1 - A_0)C_{bc}$$

Kvadratna enačba:

$$\begin{aligned}ax^2 + bx + c &= 0 \\D &= b^2 - 4ac \\x_{i,2} &= \frac{-b \pm \sqrt{D}}{2a}\end{aligned}$$

Kolenska napetost diode: $U_K = 0.7V$ Termična napetost pri $T = 27^\circ C$: $V_T = 26mV$