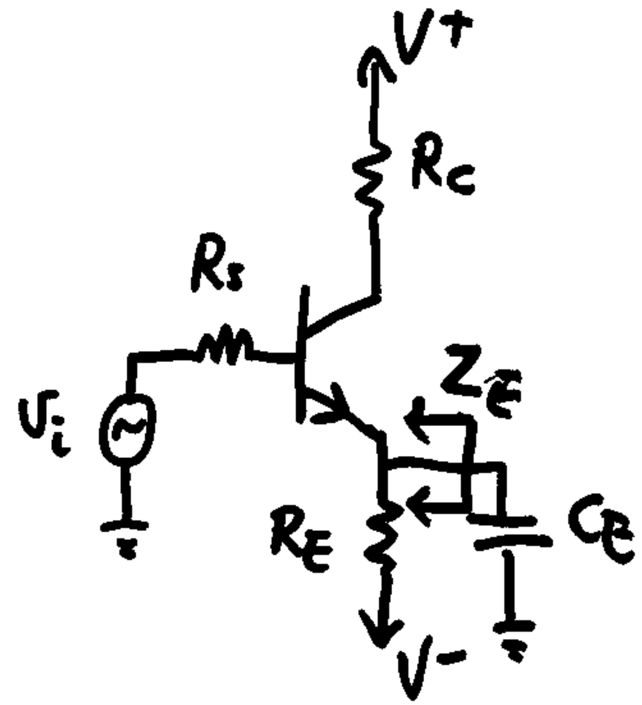
By-pass Capacitor

$$A_v = \frac{-g_m r_\pi R_C}{R_S + r_\pi + (1+\beta)R_E} \quad \frac{1 + j\omega R_E C_E}{1 + \frac{j\omega R_E (R_S + r_\pi) C_E}{R_S + r_\pi + (1+\beta) R_E}}$$



$$= \frac{-g_m r_\pi R_C}{R_S + r_\pi + (1+\beta)R_E} \cdot \frac{1 + j\omega \tau_A}{1 + j\omega \tau_B}$$

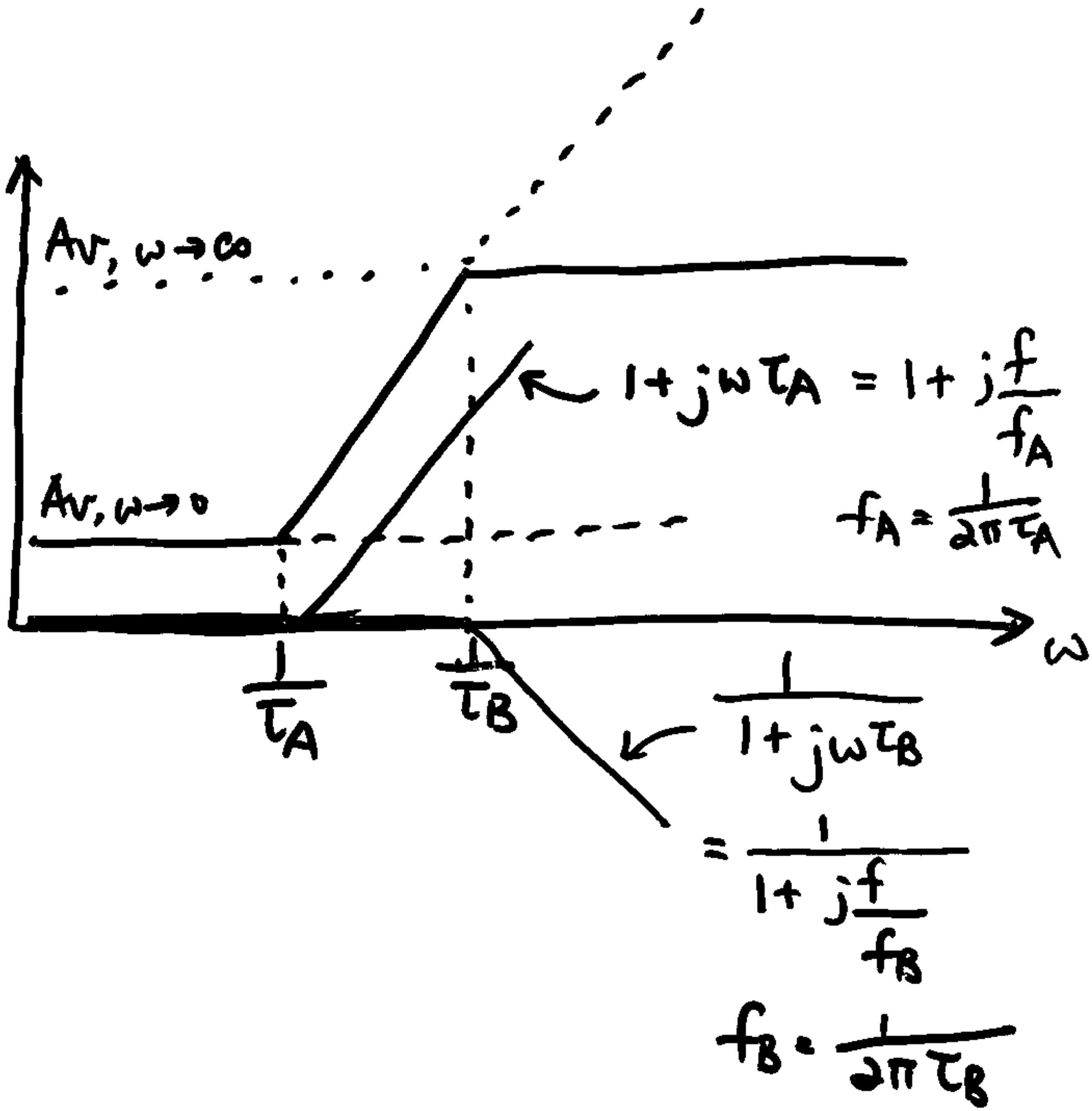
$$\tau_A = R_E C_E$$

$$\tau_B = Z_E C_E$$

$$\tau_A > \tau_B$$

$$\omega \to 0, \quad A_{v,\omega\to 0} = \frac{-g_m r_\pi R_C}{R_S + r_\pi + (1+\beta)R_E}$$

$$\omega \to \infty, \quad A_{v,\omega\to\infty} = \frac{-g_m r_\pi R_C}{R_S + r_\pi}$$



Av, ω→∞
Av, ω→0
1 + jωτA = 1 + j f/fA
fA = 1/(2πτA)
1/τA
1/τB
ω
1/(1 + jωτB)
= 1/(1 + j f/fB)
fB = 1/(2πτB)