0.2 Parametri S

$$\Gamma_{IN} = S_{11} + \frac{S_{12}S_{21}\Gamma_L}{1 - S_{22}\Gamma_L}$$
$$\Gamma_{OUT} = S_{22} + \frac{S_{21}S_{12}\Gamma_S}{1 - S_{11}\Gamma_S}$$

Cerchi di stabilità

$$D = \det \underline{\underline{S}} = S_{11}S_{22} - S_{21}S_{12}$$
$$\begin{cases} C_S &= \dfrac{(S_{11} - S_{22}^* D)^*}{|S_{11}|^2 - |D|^2} \\ r_S &= \dfrac{|S_{12}S_{21}|}{||D|^2 - |S_{11}|^2|} \end{cases}$$
$$\begin{cases} C_L &= \dfrac{(S_{22} - S_{11}^* D)^*}{|S_{22}|^2 - |D|^2} \\ r_L &= \dfrac{|S_{12}S_{21}|}{||D|^2 - |S_{22}|^2|} \end{cases}$$
$$\begin{cases} K = \dfrac{1 - |S_{11}|^2 - |S_{22}|^2 + |D|^2}{2|S_{12}S_{21}|} > 1 \\ |D| = |S_{11}S_{22} - S_{21}S_{12}| < 1 \end{cases}$$

Cerchi equi-guadagno ed equi-noise

$$\overline{g}_P = \frac{\overline{G_P}}{|S_{21}|^2}$$

$$\begin{cases} C_P = \dfrac{\overline{g}_P(S_{22} - S_{11}^* D)^*}{1 + \overline{g}_P(|S_{22}|^2 - |D|^2)} \\ r_P = \dfrac{\sqrt{1 - 2k|S_{12}S_{21}|\overline{g}_P + \overline{g}_P^2|S_{12}S_{21}|^2}}{|1 + \overline{g}_P(|S_{22}|^2 - |D|^2)|} \end{cases}$$

$$\overline{g}_A = \frac{\overline{G_A}}{|S_{21}|^2}$$

$$\begin{cases} C_A = \dfrac{\overline{g}_A(S_{11} - S_{22}^* D)^*}{1 + \overline{g}_A(|S_{11}|^2 - |D|^2)} \\ r_A = \dfrac{\sqrt{1 - 2k|S_{12}S_{21}|\overline{g}_A + \overline{g}_A^2|S_{12}S_{21}|^2}}{|1 + \overline{g}_A(|S_{11}|^2 - |D|^2)|} \end{cases}$$

$$G_{TI} = \overline{G}_T \frac{|1 - S_{11}\Gamma_S|^2}{|S_{21}|^2(1 - |\Gamma_S|^2)}$$

$$\begin{cases} C_T = \dfrac{G_{TI}}{G_{TI}\ |\Gamma_{OUT}|^2 + 1}\Gamma_{OUT}^* \\ r_T = \sqrt{\dfrac{G_{TI}^2|\Gamma_{OUT}|^2}{(G_{TI}|\Gamma_{OUT}|^2 + 1)^2} + \dfrac{1 - G_{TI}}{G_{TI}|\Gamma_{OUT}|^2 + 1}} \end{cases}$$

$$N_i = \frac{|\Gamma_S - \Gamma_{ON}|^2}{1 - |\Gamma_S|^2}$$

$$C_i = \frac{\Gamma_{ON}}{1 + N_i}$$

$$r_i = \sqrt{\frac{(1 + N_i)N_i - N_i|\Gamma_{ON}|^2}{(1 + N_i)^2}}$$

$$NF = NF_{MIN} + \frac{4r_n|\Gamma_S - \Gamma_{ON}|^2}{(1 - |\Gamma_S|^2)|1 + \Gamma_{ON}|^2}$$