

## Formulario Parametri S

$$D = s_{11}s_{22} - s_{12}s_{21} ; \quad K = \frac{1 - |s_{11}|^2 - |s_{22}|^2 + |D|^2}{2|s_{12}s_{21}|}$$

### Cerchio di Stabilità in ingresso

$$c_S = \frac{(s_{11} - s_{22}^* D)^*}{|s_{11}|^2 - |D|^2} ; \quad r_S = \frac{|s_{12}s_{21}|}{||D|^2 - |s_{11}|^2|}$$

### Cerchio di Stabilità in uscita

$$c_L = \frac{(s_{22} - s_{11}^* D)^*}{|s_{22}|^2 - |D|^2} ; \quad r_L = \frac{|s_{12}s_{21}|}{||D|^2 - |s_{22}|^2|}$$

### Cerchi equi-G<sub>A</sub>

$$g_A = \frac{G_A}{|s_{21}|^2} ; \quad c_A = \frac{g_A (s_{11} - s_{22}^* D)^*}{1 + g_A (|s_{11}|^2 - |D|^2)} ; \quad r_A = \frac{\sqrt{1 - 2K |s_{12}s_{21}| g_A + g_A^2 |s_{12}s_{21}|^2}}{|1 + g_A (|s_{11}|^2 - |D|^2)|}$$

### Cerchi equi-G<sub>P</sub>

$$g_P = \frac{G_P}{|s_{21}|^2} ; \quad c_P = \frac{g_P (s_{22} - s_{11}^* D)^*}{1 + g_P (|s_{22}|^2 - |D|^2)} ; \quad r_P = \frac{\sqrt{1 - 2K |s_{12}s_{21}| g_P + g_P^2 |s_{12}s_{21}|^2}}{|1 + g_P (|s_{22}|^2 - |D|^2)|}$$

### Cerchi equi-noise

$$N_i = \frac{|\Gamma_s - \Gamma_{ON}|^2}{1 - |\Gamma_s|^2} ; \quad c_i = \frac{\Gamma_{ON}}{1 + N_i} ; \quad r_i = \sqrt{\frac{(1 + N_i) N_i - N_i |\Gamma_{ON}|^2}{(1 + N_i)^2}} ; \quad NF = NF_{\min} + \frac{4r_n |\Gamma_s - \Gamma_{ON}|^2}{(1 - |\Gamma_s|^2) |1 + \Gamma_{ON}|^2}$$

### Terminazioni ottime

$$B_1 = 1 - |s_{22}|^2 + |s_{11}|^2 - |D|^2 ; \quad B_2 = 1 - |s_{11}|^2 + |s_{22}|^2 - |D|^2 ; \quad C_1 = s_{11} - s_{22}^* D ; \quad C_2 = s_{22} - s_{11}^* D$$

$$\angle \Gamma_{SOPT} = \angle C_1^* ; \quad |\Gamma_{SOPT}| = \frac{B_1}{2|C_1|} - \sqrt{\frac{B_1^2 - 4|C_1|^2}{4|C_1|^2}}$$

$$\angle \Gamma_{LOPT} = \angle C_2^* ; \quad |\Gamma_{LOPT}| = \frac{B_2}{2|C_2|} - \sqrt{\frac{B_2^2 - 4|C_2|^2}{4|C_2|^2}}$$