

TPL4

1) si $\alpha_{max} = 1dB \rightarrow \xi^2 = 10^{\frac{\alpha_{max}}{10}} - 1 \rightarrow \boxed{\xi^2 = 0,291}$

si utilizo la aproximación de máx planicidad

$$|H(j\omega)|^2 = \frac{1}{1 + \xi^2 \cdot \omega^{2n}} \rightarrow \text{si } [n=2] \rightarrow |H(\omega)|^2 = \frac{1}{1 + \xi^2 \cdot \omega^4}$$

$$|H(s)|^2 = \frac{\frac{1}{\xi^2}}{s^4 + \frac{1}{\xi^2}} \quad (1)$$

si es un paraboloides de orden 2 y empieza en 0dB

$$|T(s)|^2 = T(s) \cdot T(-s) = \frac{b}{s^2 + s \cdot a + b} \cdot \frac{b}{s^2 + s \cdot a + b}$$

$$|T(s)|^2 = \frac{b^2}{(s^4 - s^3 \cdot a + s^2 \cdot b) + (s^3 \cdot a - s^2 \cdot a^2 + s \cdot a \cdot b) + (s^2 \cdot b - s \cdot a \cdot b + b^2)}$$

$$|T(s)|^2 = \frac{b^2}{s^4 + s^2 \cdot (2b - a^2) + b^2} \quad (2)$$

igualdo (1) y (2)

$$b^2 = \frac{1}{\xi^2} \rightarrow \boxed{b = 1,965}$$

$$(2b - a^2) = 0 \rightarrow \boxed{a = 1,982}$$

$$T(s) = \frac{1,965}{s^2 + s \cdot 1,982 + 1,965}$$

$$\omega_0^2 = 1,965 \rightarrow \omega_0 = 1,4$$

$$K = 1$$

$$1,982 = \frac{\omega_0}{Q} \rightarrow Q = 0,7$$

$$2) \lim_{s \rightarrow j\omega} T(s) = \frac{1,965}{\omega^2 + j\omega \cdot 1,982 + 1,965} = \frac{1,965}{(1,965 - \omega^2) + j\omega \cdot 1,982}$$

$$T(\omega) = \frac{1,965}{\sqrt{(1,965 - \omega^2)^2 + (\omega \cdot 1,982)^2}} \cdot \frac{1}{e^{j \arctan\left(\frac{\omega \cdot 1,982}{1,965 - \omega^2}\right)}}$$

$$|T(0)| = 1$$

$$|T(\infty)| = 0$$

$$|T(\omega_0)| = 0,71$$

$$\omega_0 = 1,4$$

$$\angle T(0) = \pi$$

$$\angle T(\infty) = 0$$

$$\angle T(\omega_0) = \frac{\pi}{2}$$

