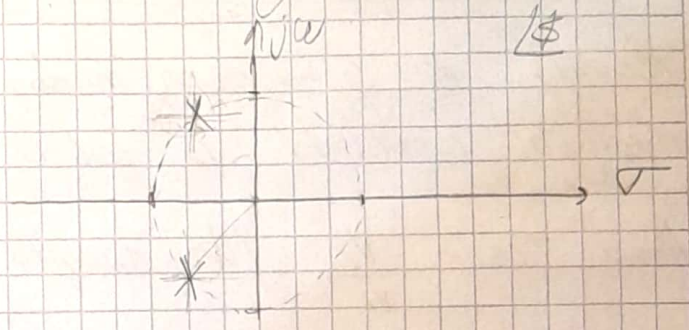
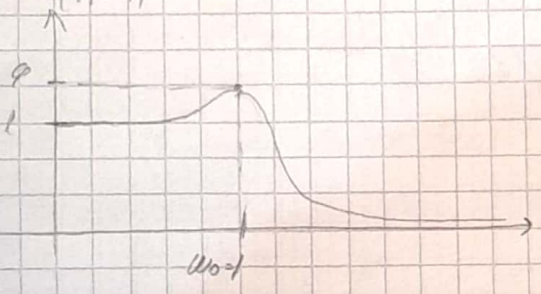
Anexo: Respuesta de módulo y fase aproximada.

A partir de la transferencia normalizada, y asumiendo $k_3 = k_1$

$$T(\Phi) = \frac{-1}{\Phi^2 + \Phi \cdot \frac{1}{\varphi} + 1}$$



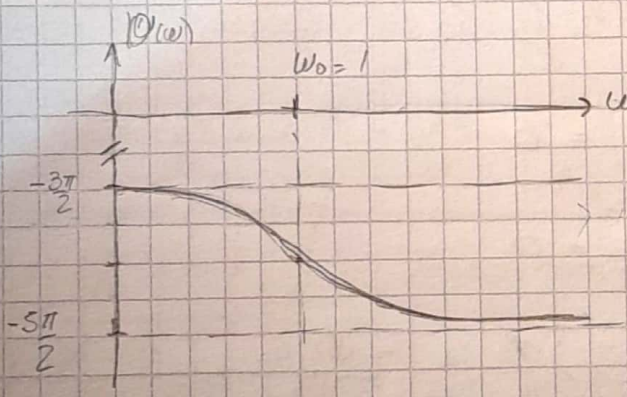
$$T(\omega) = T(\Phi)\Big|_{\Phi = j\omega} = \frac{-1}{(1-\omega^2) + j\frac{\omega}{\varphi}}$$



$$|T(\omega)|\Big|_{\omega=\phi} = 1$$

$$|T(\omega)|\Big|_{\omega=\omega_0=1} = \varphi$$

$$|T(\omega)|\Big|_{\omega\to\infty} = 0$$



$$\theta(\omega)\Big|_{\omega=0} = \frac{\pi}{2} - 2\pi = -\frac{3\pi}{2}$$

$$\theta(\omega)\Big|_{\omega=0} = \text{Mitad de excursión}$$

$$\theta(\omega)\Big|_{\omega\to\infty} = \frac{\pi}{2} - 3\pi = -\frac{5\pi}{2}$$

(X)

NOTA