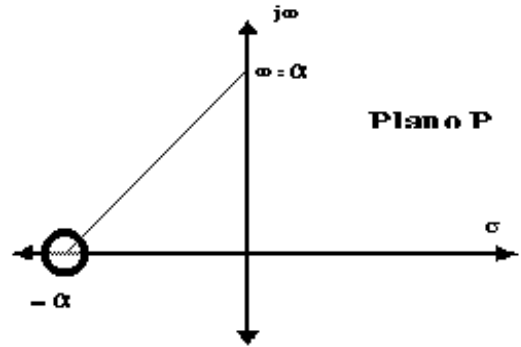# CERO SIMPLE FUERA DEL ORIGEN

$$F_{(P)} = (P + \alpha) = \alpha \left(\frac{P}{\alpha} + 1 \right)$$

$$F_{(j\omega)} = \frac{j\omega}{\alpha} + 1$$

MÓDULO

$$\boxed{|M| = 20\,Log\sqrt{1 + \left(\frac{\varpi}{\alpha}\right)^2}}$$

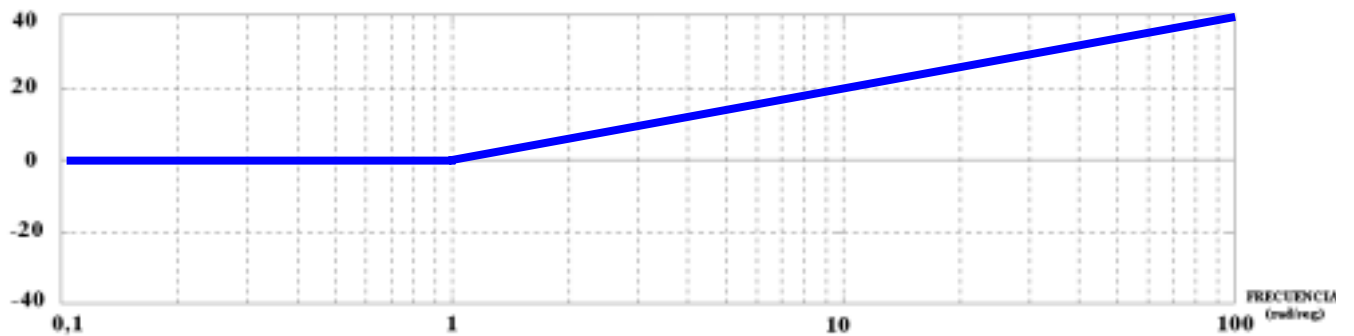$\dfrac{\varpi}{\alpha} = 100 \Rightarrow |M| = 20\ Log\ \sqrt{1 + (100\ )^2} = +40\ dB$

$\dfrac{\varpi}{\alpha} = 10 \Rightarrow |M| = 20\ Log\ \sqrt{1 + (10\ )^2} = +20\ dB$

$\dfrac{\varpi}{\alpha} = 1 \Rightarrow |M| = 20\ Log\ \sqrt{1 + (1)^2} \cong 0\ dB$

$\dfrac{\varpi}{\alpha} = 0.1 \Rightarrow |M| = 20\ Log\ \sqrt{1 + (0.1)^2} = 0\ dB$

$\dfrac{\varpi}{\alpha} = 0.01 \Rightarrow |M| = 20\ Log\ \sqrt{1 + (0.01\ )^2} = 0\ dB$

FASE

$$\boxed{\varphi = tg^{-1}\frac{Im}{Re} = tg^{-1}\frac{\dfrac{\varpi}{\alpha}}{1}}$$

$\dfrac{\varpi}{\alpha} = 100 \Rightarrow \varphi = tg^{-1}\dfrac{\varpi}{\alpha} = tg^{-1}\ 100 \cong 90°$

$\dfrac{\varpi}{\alpha} = 10 \Rightarrow \varphi = tg^{-1}\dfrac{\varpi}{\alpha} = tg^{-1}\ 10 \cong 90°$

$\dfrac{\varpi}{\alpha} = 1 \Rightarrow \varphi = tg^{-1}\dfrac{\varpi}{\alpha} = tg^{-1}\ 1 \cong 0°°$

$\dfrac{\varpi}{\alpha} = 0.1 \Rightarrow \varphi = tg^{-1}\dfrac{\varpi}{\alpha} = tg^{-1}\ 0.1 \cong 0°$

$\dfrac{\varpi}{\alpha} = 0.01 \Rightarrow \varphi = tg^{-1}\dfrac{\varpi}{\alpha} = tg^{-1}\ 0.01 \cong 0°$