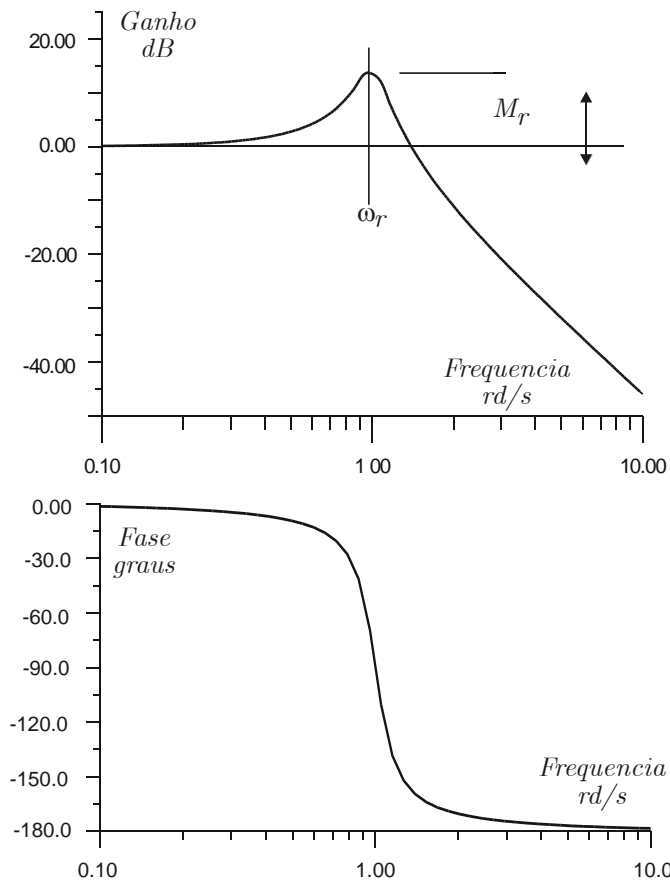
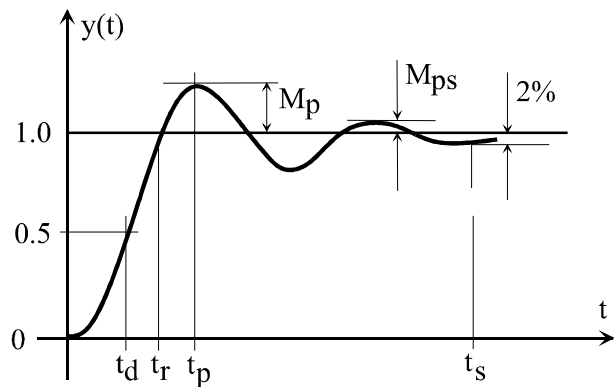
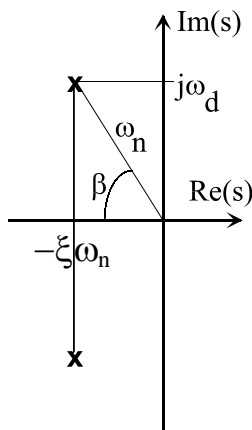




## EE-205/2015

### Sistemas de 2ª Ordem

$$\frac{Y(s)}{U(s)} = \frac{\omega_n^2}{s^2 + 2\xi\omega_n s + \omega_n^2}$$



$$t_r = \frac{\pi - \beta}{\omega_d}$$

$$t_{s|2\%} = \frac{4}{\xi\omega_n}$$

$$t_p = \frac{\pi}{\omega_d}$$

$$M_p = \exp\left(-\frac{\xi}{\sqrt{1-\xi^2}}\pi\right)$$

$$\beta = \cos^{-1} \xi$$

$$\omega_r = \omega_n \sqrt{1-2\xi^2}$$

$$\omega_d = \omega_n \sqrt{1-\xi^2}$$

$$M_r = \frac{1}{2\xi\sqrt{1-\xi^2}}$$

$$\delta = \ln \frac{M_p}{M_{ps}} = \frac{2\xi\pi}{\sqrt{1-\xi^2}}$$