

Studio del transitorio con input sinusoidale - Caso sottosmorzato

$$m := 16$$

$$k := 5000$$

$$c := 15$$

Parametri della forzante

$$F_0 := 100$$

$$\Omega := 8$$

Condizioni iniziali

$$x_0 := 0.05$$

$$v_0 := 1.5$$

$$\omega := \sqrt{\frac{k}{m}} = 17.678$$

$$\xi := \frac{c}{2 \cdot m \cdot \omega} = 0.027$$

$$\omega_s := \omega \sqrt{1 - \xi^2} = 17.671$$

$$\delta_{st} := \frac{F_0}{k} = 0.02$$

$$r := \frac{\Omega}{\omega} = 0.453$$

Moto a regime

$$X := \frac{\delta_{st}}{\sqrt{(1-r^2)^2 + (2 \cdot \xi \cdot r)^2}} = 0.025$$

$$\varphi := \operatorname{atan2}\left[(1-r^2)^2, 2 \cdot \xi \cdot r\right] = 0.038 \cdot \text{rad} \quad \varphi = 2.174 \cdot \text{deg}$$

$$x_{part}(t) := X \cdot \sin(\Omega \cdot t - \varphi)$$

Soluzione eq. omogenea

$$A := x_0 + X \cdot \sin(\varphi) = 0.051$$

$$B := \frac{1}{\omega_s} \cdot (v_0 - \Omega \cdot X \cdot \cos(\varphi) + \xi \cdot \omega \cdot A) = 0.075$$

$$x_{omo}(t) := e^{-\xi \cdot \omega \cdot t} \cdot (A \cdot \cos(\omega_s \cdot t) + B \cdot \sin(\omega_s \cdot t))$$

$$x(t) := x_{omo}(t) + x_{part}(t)$$

$$t := 0, 0.001 \dots 20$$

