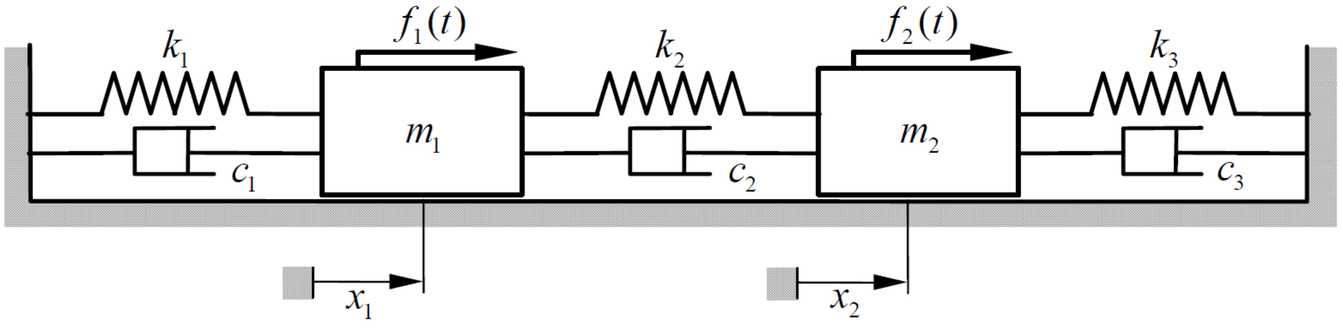
Sistema a 2 gdl con forzanti armoniche: moto a regime e diagrammi di risposta in frequenza



$m_1 := 5$

$m_2 := 8$

$k_1 := 1600$

$k_2 := 2300$

$k_3 := 1500$

$c_1 := 25$

$c_2 := 10$

$c_3 := 15$

$\Omega := 15$

$F_1 := 100$ $\psi_1 := 0$

$F_2 := 80$ $\psi_2 := \frac{2}{3}\cdot\pi\cdot 0 = 0$

Forzanti

$f_1(t) := F_1\cdot sin(\Omega\cdot t + \psi_1)$ $f_1(t) \rightarrow 100\cdot sin(15\cdot t)$

$f_2(t) := F_2\cdot sin(\Omega\cdot t + \psi_2)$ $f_2(t) \rightarrow 80\cdot sin(15\cdot t)$

$$\mathbf{M} := \begin{pmatrix} m_1 & 0 \\ 0 & m_2 \end{pmatrix} = \begin{pmatrix} 5 & 0 \\ 0 & 8 \end{pmatrix} \qquad diag\left(\begin{pmatrix} m_1 \\ m_2 \end{pmatrix}\right) = \begin{pmatrix} 5 & 0 \\ 0 & 8 \end{pmatrix}$$

$$\mathbf{K} := \begin{bmatrix} (k_1 + k_2) & -k_2 \\ -k_2 & (k_2 + k_3) \end{bmatrix} = \begin{pmatrix} 3900 & -2300 \\ -2300 & 3800 \end{pmatrix}$$

$$\mathbf{C} := \begin{bmatrix} (c_1 + c_2) & -c_2 \\ -c_2 & (c_2 + c_3) \end{bmatrix} = \begin{pmatrix} 35 & -10 \\ -10 & 25 \end{pmatrix}$$

$$\mathbf{F} := \begin{pmatrix} F_1 \cdot e^{i \cdot \psi_1} \\ F_2 \cdot e^{i \cdot \psi_2} \end{pmatrix} \qquad \mathbf{F} = \begin{pmatrix} 100 \\ 80 \end{pmatrix}$$

Matrice di impedenza

$$\mathbf{Z} := \left(\mathbf{K} - \Omega^2 \cdot \mathbf{M}\right) + i \cdot \Omega \cdot \mathbf{C} = \begin{pmatrix} 2775 + 525i & -2300 - 150i \\ -2300 - 150i & 2000 + 375i \end{pmatrix}$$

$$\mathbf{X} := \mathbf{Z}^{-1} \cdot \mathbf{F} = \begin{pmatrix} 0.052 - 0.271i \\ 0.06 - 0.319i \end{pmatrix}$$

$X_1 := \left|\mathbf{X}_1\right| = 0.276 \qquad \varphi_1 := arg\left(\mathbf{X}_1\right) = -1.382 \cdot rad \qquad \varphi_1 = -79.156 \cdot deg$

$X_2 := \left|\mathbf{X}_2\right| = 0.325 \qquad \varphi_2 := arg\left(\mathbf{X}_2\right) = -1.384 \cdot rad \qquad \varphi_2 = -79.314 \cdot deg$

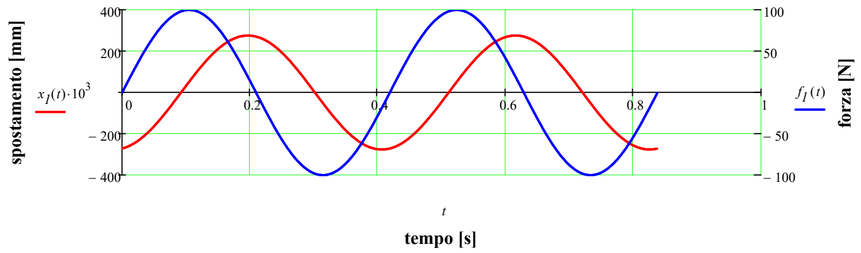
$\Omega = 15 \qquad T := \frac{2 \cdot \pi}{\Omega} = 0.419$

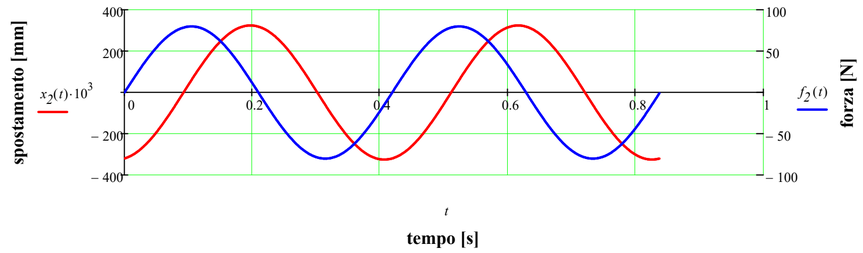
$N_{per} := 2$

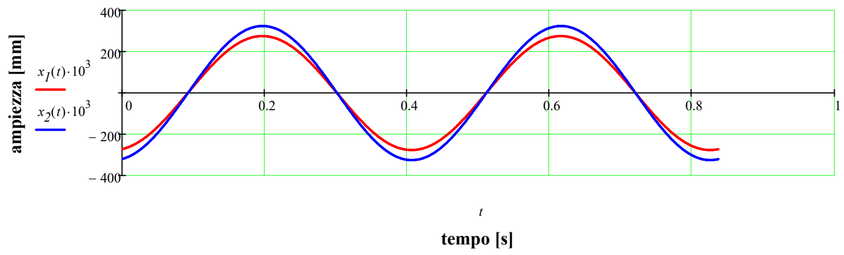
$x_1(t) := X_1 \cdot sin\left(\Omega \cdot t + \varphi_1\right)$

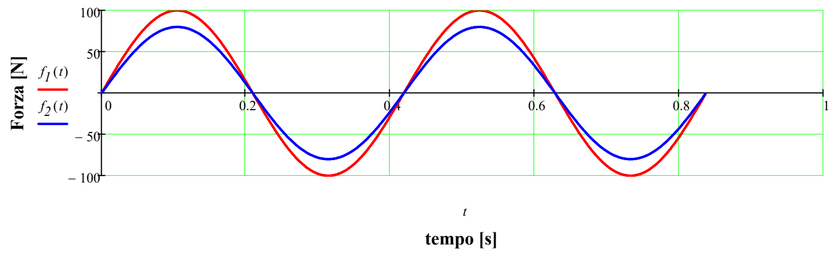
$x_2(t) := X_2 \cdot sin\left(\Omega \cdot t + \varphi_2\right)$

$t := 0, 0.001 .. 2 \cdot T$









$\Omega := 0, 0.01 .. 60$

$\mathbf{C}(SMORZ) := \begin{bmatrix} (c_1 + c_2) & -c_2 \\ -c_2 & (c_2 + c_3) \end{bmatrix} \cdot SMORZ$

$$\mathbf{Z}(\Omega, SMORZ) := \left(\mathbf{K} - \Omega^2 \cdot \mathbf{M}\right) + i \cdot \Omega \cdot \mathbf{C}(SMORZ)$$

$$\mathbf{X}(\Omega, SMORZ) := \mathbf{Z}(\Omega, SMORZ)^{-1} \cdot \mathbf{F}$$

$$X_1(\Omega, SMORZ) := \left|\mathbf{X}(\Omega, SMORZ)_1\right|$$

$$X_2(\Omega, SMORZ) := \left|\mathbf{X}(\Omega, SMORZ)_2\right|$$

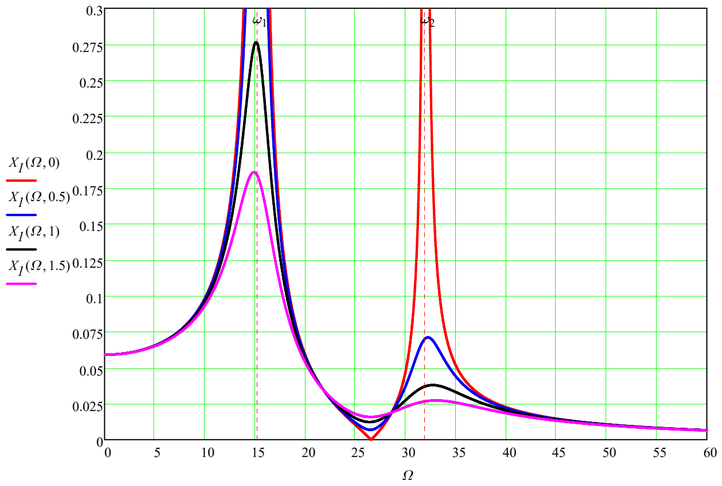
$$\varphi_1(\Omega, SMORZ) := arg\left(\mathbf{X}(\Omega, SMORZ)_1\right)$$

$$\varphi_2(\Omega, SMORZ) := arg\left(\mathbf{X}(\Omega, SMORZ)_2\right)$$

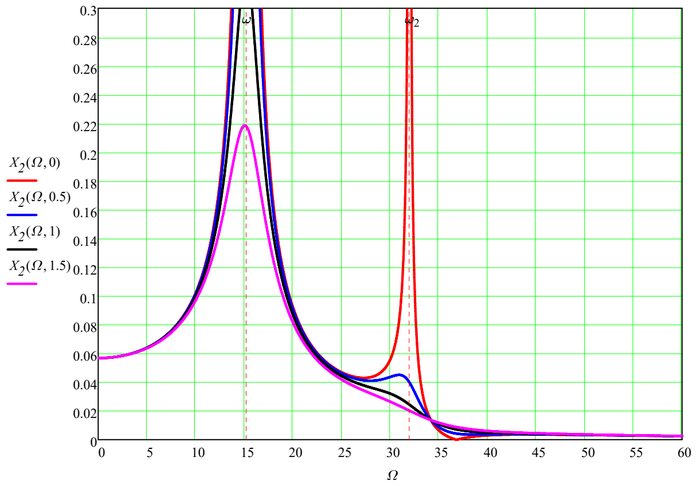
Pulsazioni proprie

$$\omega := sort\left(\sqrt{genvals(\mathbf{K}, \mathbf{M})}\right) = \begin{pmatrix} 15.269 \\ 31.966 \end{pmatrix}$$

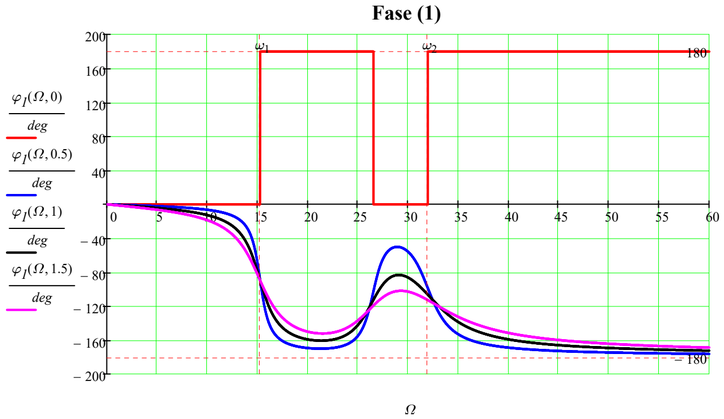
Ampiezza (1)



Ampiezza (2)



Fase (1)



Fase (2)