

LISTA E

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PME 3380

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Exercícios:

Utilizando o programa *scilab* criamos um algoritmo capaz de resolver numericamente o problema apresentado no exemplo.

A seguir temos os resultados obtidos para os diferentes casos de amortecimento:

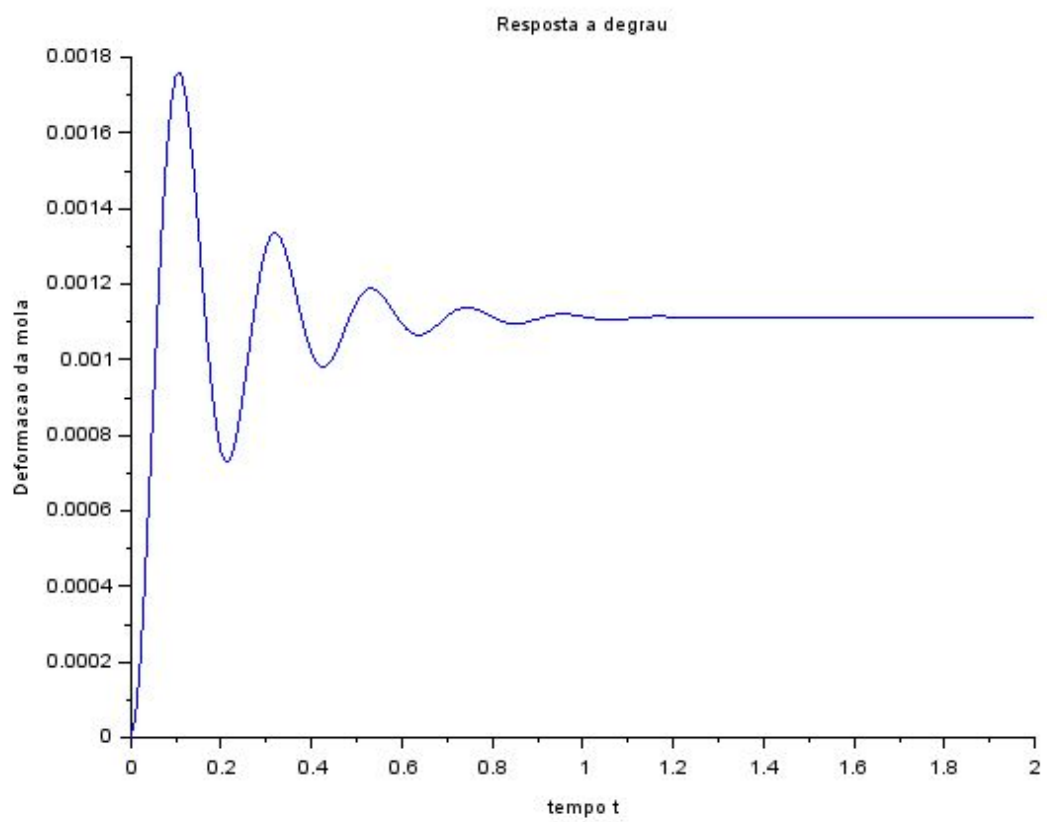
Transferência:

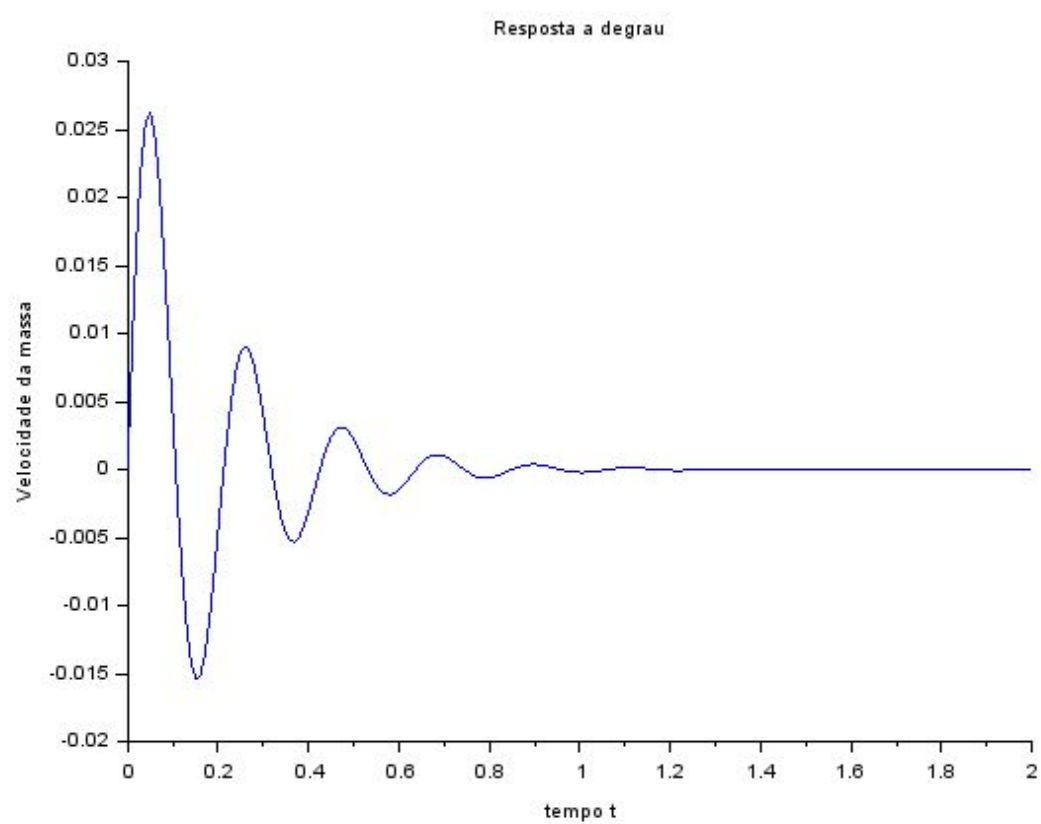
$$\begin{aligned} \dot{x}_1 &= x_2 \\ \dot{x}_2 &= \frac{-k}{m}x_1 - \frac{b}{m}x_2 + \frac{F(t)}{m} \end{aligned}$$

$$\begin{aligned} sX_1 &= X_2 \\ sX_2 &= \frac{-k}{m}X_1 - \frac{b}{m}X_2 + \frac{U}{m} \end{aligned}$$

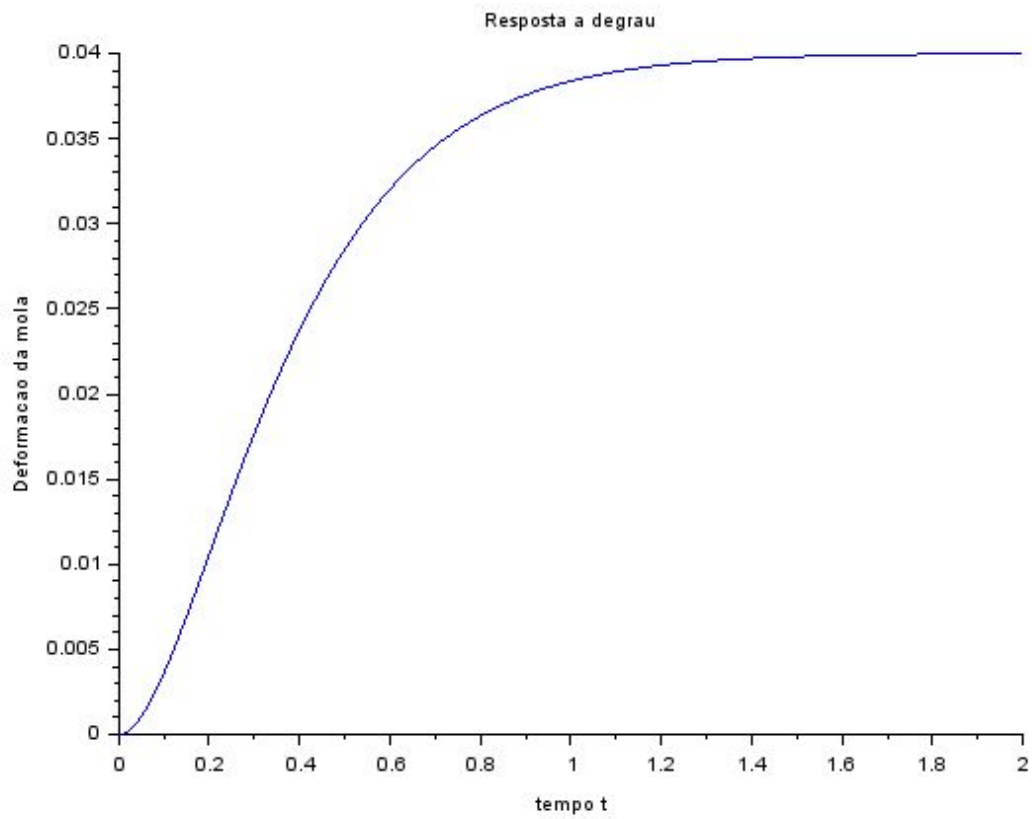
$$G(s) = \frac{Y(s)}{F(s)} = \frac{1}{ms^2 + bs + k}$$

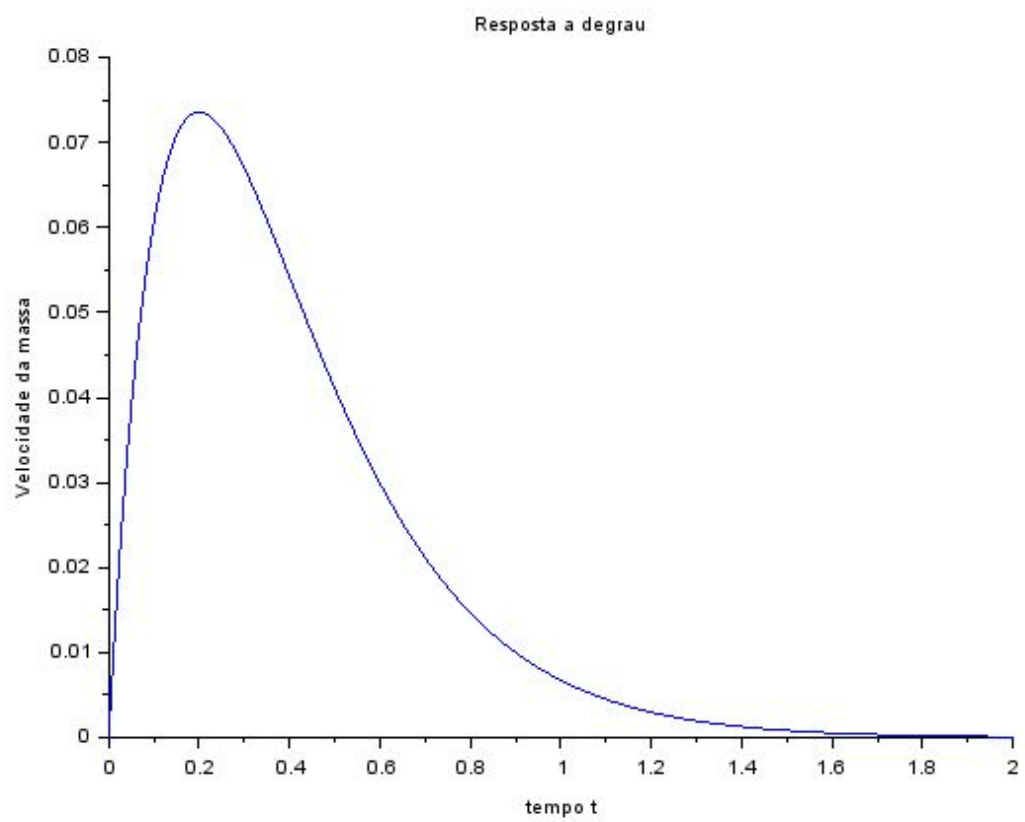
$$\zeta = \frac{b}{2\sqrt{km}} < 1$$



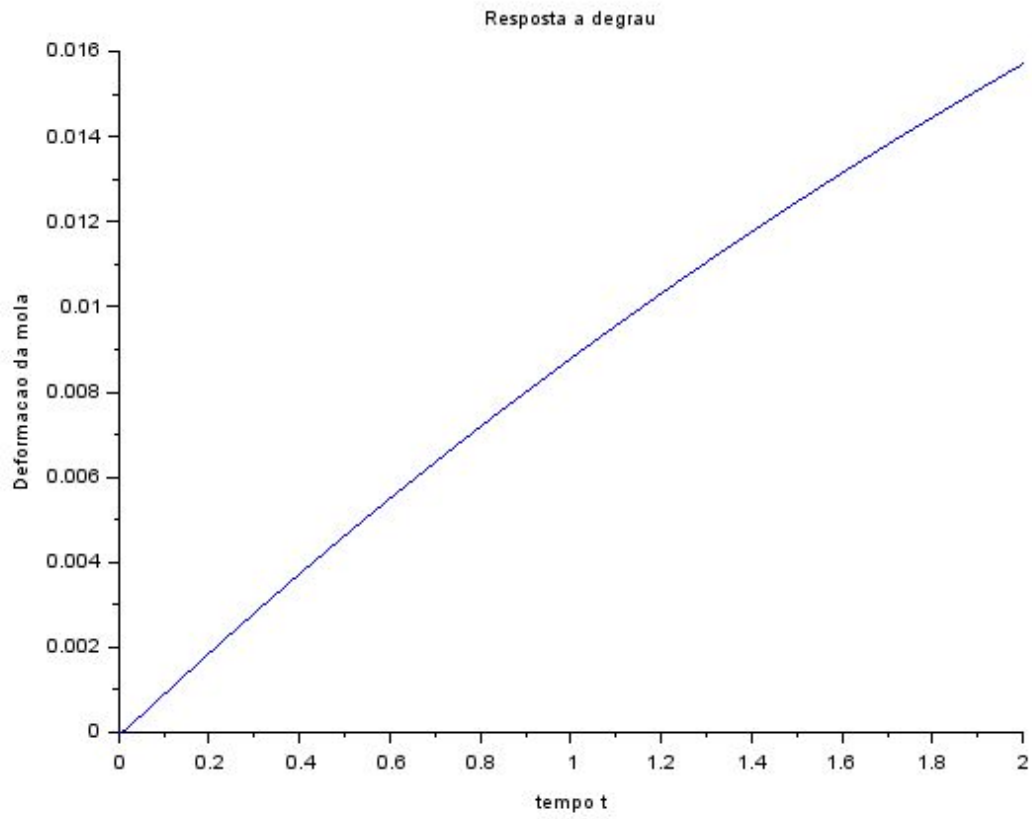


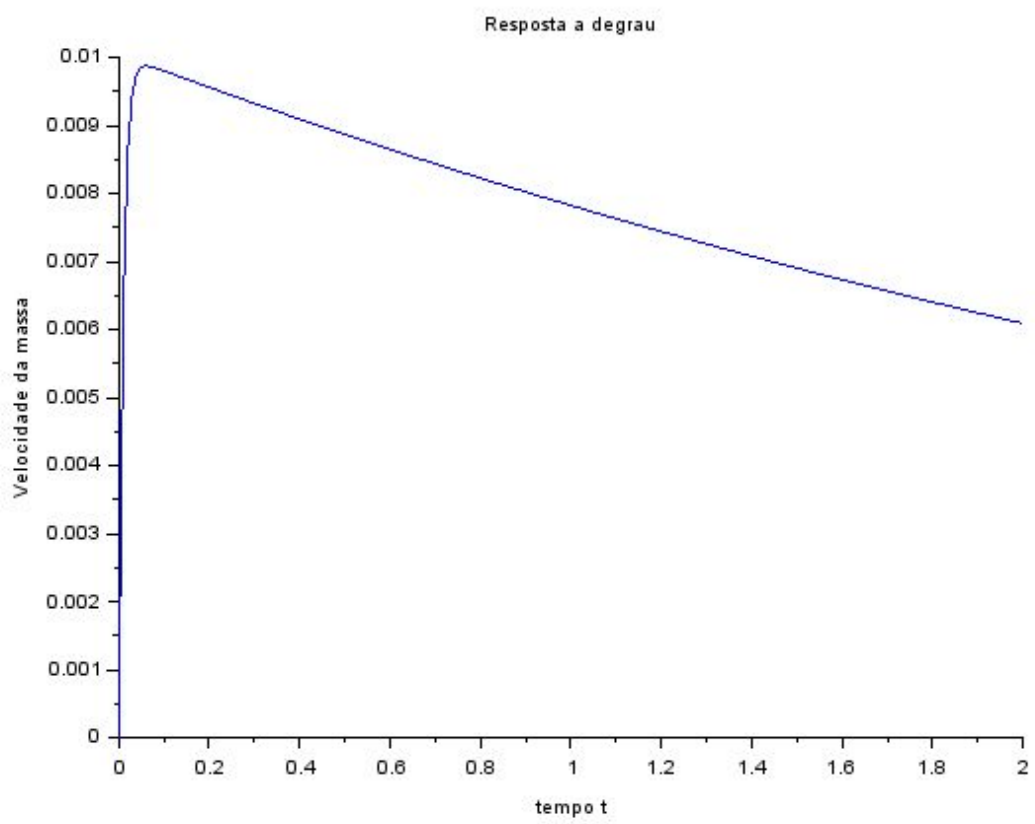
$$\zeta = \frac{b}{2\sqrt{km}} = 1$$





$$\zeta = \frac{b}{2\sqrt{km}} > 1$$





Exercícios:

1:

Matriz A:

$$\begin{bmatrix} 0 & 1 \\ -\frac{k}{m} & -\frac{b}{m} \end{bmatrix}$$

$$\lambda_1 = \frac{b - \sqrt{b^2 - 4km}}{2m}$$

$$\lambda_2 = \frac{b + \sqrt{b^2 - 4km}}{2m}$$

Função de transferência:

$$G(s) = \frac{Y(s)}{F(s)} = \frac{1}{ms^2 + bs + k}$$

$$\lambda_1 = -\frac{b + \sqrt{b^2 - 4km}}{2m}$$

$$\lambda_2 = \frac{b - \sqrt{b^2 - 4km}}{2m}$$

As raízes são bastante parecidas.