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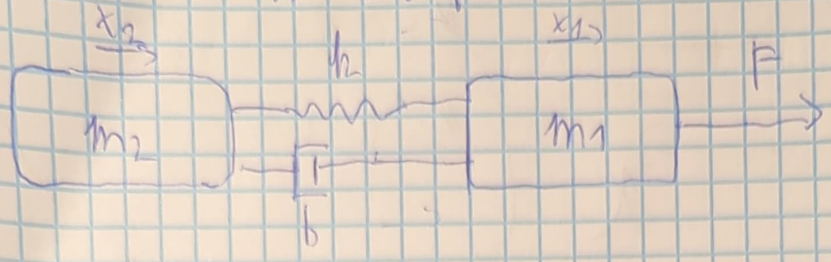
AQCOKQ

1. Házi feladat



Adatok:

Kezdet: $x_1 - x_2$ $b = 0{,}5$ $k = 5$ $U = 6$ $\omega = 1{,}2$ $\sigma = 0{,}01$

①

$$\begin{cases} m_1 \cdot \ddot{x}_1 = F + k \cdot (x_2 - x_1) + b \cdot (\dot{x}_2 - \dot{x}_1) \\ m_2 \cdot \ddot{x}_2 = -k \cdot (x_1 - x_2) - b \cdot (\dot{x}_2 - \dot{x}_1) \end{cases}$$

$$\begin{cases} F = m_1 \cdot \ddot{x}_1 - k \cdot (x_2 - x_1) - b \cdot (\dot{x}_2 - \dot{x}_1) & ① \\ 0 = m_2 \ddot{x}_2 + k \cdot (x_2 - x_1) + b \cdot (\dot{x}_2 - \dot{x}_1) & ② \end{cases}$$

$$\begin{cases} F(s) = m_1 s^2 x_1 - k x_2 + k x_1 - b s x_2 + b s x_1 & ① \\ 0 = m_2 s^2 x_2 + k x_2 - k x_1 + b s x_2 - b s x_1 & ② \end{cases}$$

$$\begin{cases} F(s) = x_1 \cdot (m_1 s^2 - k - b s) + x_2 \cdot (k + b s) & ① \\ 0 = x_1 \cdot (k + b s) + x_2 \cdot (m_2 s^2 - k - b s) & ② \end{cases}$$

②-ből: $x_2 = -x_1 \cdot \dfrac{(k + b(s))}{(m_2 s^2 - k - b s)}$

$$\begin{cases} F(s) = x_1 \cdot (m_1 s^2 + k_1 + b s x_1) - x_2 (k + b s) & ① \\ 0 = -x_1 \cdot (k + b s) + x_2 \cdot (m_2 s^2 + k + b s) & ② \end{cases}$$

2-ből: $x_2 = x_1 \cdot \dfrac{(k + b s)}{m_2 s^2 + k b s}$

A bemutat:

$$x_1 - x_2 = x_1 - x_1 \cdot \frac{k + bs}{m_2 s^2 + k + bs} = x_1 \cdot (m_2 s^2 + bs + k) - x_1 \cdot \ldots$$

$$\ldots (k + bs) = x_1 m_2 s^2 + x_1 bs + x_1 k - x_1 bs - x_1 k =$$

$$= \underline{\underline{x_1 \cdot m_2 s^2}}$$

A bemutat:

$$F = x_1 \cdot (m_1 s^2 + bs + k) - x_1 \frac{\cdot (bs + k)}{m_2 s^2 + bs + k} \cdot (bs + k)$$

$$bs^2 + 2bks + k^2$$

$$= (x_1 m_1 s^2 + x_1 bs + x_1 k)(m_2 s^2 + bs + k) - \cancel{x_1 (bs + k)^2}$$

$$- x_1 (bs + k)(bs + k)$$

$$= x_1 m_1 m_2 s^4 + x_1 m_1 b s^3 + x_1 m_1 k s^2 + x_1 b m_2 s^3 + \cancel{x_1 b^2 s^2} + x_1 b k s$$

$$+ x_1 k m_2 s^2 + \cancel{x_1 k b s} + x_1 k^2 - \cancel{x_1 b^2 s^2} - 2 x_1 b k s - x_1 k^2$$

$$= x_1 m_1 m_2 s^4 + x_1 m_1 b s^3 + x_1 m_1 k s^2 + x_1 b m_2 s^3 + x_1 b m_2 s^2$$

$$= x_1 m_1 m_2 s^4 + x_1 b m_1 s^3 + x_1 b m_2 s^3 + x_1 m_1 k s^2 + x_1 m_2 k s^2$$

$$G(s) = \frac{Y(s)}{U(s)} = \frac{x_1 - x_2}{F}$$

$$G(s) = \frac{x_1 m_1 s^2}{x_1 m_1 m_2 s^4 + x_1 b m_1 s^3 + x_1 b m_2 s^3 + x_1 k m_1 s^2 + x_1 k m_2 s^2}$$

$$= \frac{m_1}{m_1 m_2 s^2 + m_1 b s + m_2 b s + m_1 k + m_2 k} = \frac{m_1}{m_1 m_2 s^2 + (m_1 + m_2) b s + (m_1 + m_2) k}$$