7.13

torsdag 22 februari 2024 19:47

a) $f_{s_1}(t) \longrightarrow y_{s_1}(t) = f_{s_2}(t) \longrightarrow y_{s_2}(t)$

$$H_{s_1}(s) = \frac{Y_{s_1}(s)}{F_{s_1}(s)}$$

$$H_{s_2}(s) = \frac{Y_{s_2}(s)}{F_{s_2}(s)}$$

$$H(s) = H_{s_1} \cdot H_{s_2} = \frac{Y_{s_2}(s)}{F_{s_1}(s)}$$

b)

$$H_{s_1} = \frac{1}{s} - \frac{1}{s+2}$$

$$H_{s_2} = \frac{s}{s^2+1}$$

$$H = H_{s_1} \cdot H_{s_2} = \frac{s}{s^2+1} \cdot \left(\frac{1}{s} - \frac{1}{s+2} \right) =$$

$A = -2/5 \quad B = -1/5 \quad C = 2/5$

$$= \frac{1}{s^2+1} - \frac{s}{(s^2+1)(s+2)} = \frac{1}{s^2+1} + \frac{As+B}{s^2+1} + \frac{C}{s+2} =$$

$$= \frac{1}{s^2+1} - \frac{1}{5} \frac{2s+1}{s^2+1} + \frac{2}{5} \cdot \frac{1}{s+2} =$$

$$= \frac{2}{5} \cdot \frac{2-s}{s^2+1} + \frac{2}{5} \cdot \frac{1}{s+2} =$$

$$= \frac{4}{5} \cdot \frac{1}{s^2+1} - \frac{2}{5} \cdot \frac{s}{s^2+1} + \frac{2}{5} \cdot \frac{1}{s+2}$$

$$h(t) = \frac{2}{5} \left(2\sin t - \cos t + e^{-2t} \right) \theta(t)$$