

1) Verdiği zömerle nedensel DTD bir sistemin frekans gerisi

$$H(j\omega) = \frac{j\omega + 2}{-\omega^2 + 5j\omega + 4} \text{ seklinde verilmiştir.}$$

girişin $x(t) = e^{-3t} u(t)$ olması durumunda çıkış ifadesi $y(t)$ 'yi bulunuz.

$$y(t) = x(t) * h(t) \xleftrightarrow{\mathcal{F}} Y(j\omega) = X(j\omega) H(j\omega)$$

$$x(t) = e^{-3t} u(t) \xleftrightarrow{\mathcal{F}} X(j\omega) = \frac{1}{3 + j\omega}$$

$$H(j\omega) = \frac{j\omega + 2}{(4 + j\omega)(1 + j\omega)} = \frac{A}{4 + j\omega} + \frac{B}{1 + j\omega}$$

$$= \frac{2/3}{4 + j\omega} + \frac{1/3}{1 + j\omega}$$

$$Y(j\omega) = \left(\frac{1}{3 + j\omega} \right) \left(\frac{2/3}{4 + j\omega} + \frac{1/3}{1 + j\omega} \right)$$

$$= \frac{2/3}{(3 + j\omega)(4 + j\omega)} + \frac{1/3}{(3 + j\omega)(1 + j\omega)}$$

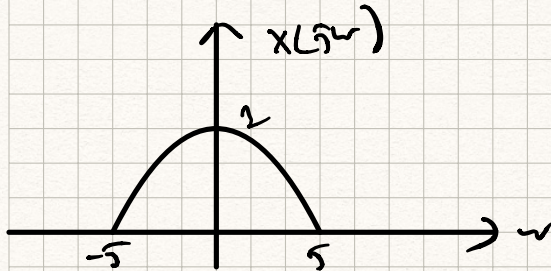
$$Y(j\omega) = \frac{-2/3}{4 + j\omega} + \frac{2/3}{3 + j\omega} + \frac{-1/6}{3 + j\omega} + \frac{1/6}{1 + j\omega}$$

$$y(t) = \left(-\frac{2}{3} \right) \cdot e^{-4t} \cdot u(t) + \frac{3}{6} e^{-3t} u(t) + \frac{1}{6} e^{-t} u(t)$$

(2)

$x(t)$ izretimin Fourier dönüşümü aşağıda çizilmiştir.

$z(t) = [1 + 0.5 x(t)] \cos(2\pi 5t)$ olduğuna göre $Z(j\omega)$ 'yi çiziniz.



$$z(t) = [1 + 0.5 x(t)] \cos(2\pi 5t) = \cos(2\pi 5t) + 0.5 x(t) \cos(2\pi 5t)$$

$$\mathcal{F}\{z(t)\} = \mathcal{F}\{\cos(2\pi 5t)\} + \mathcal{F}\{0.5 x(t) \cos(2\pi 5t)\}$$

$$x(t)y(t) \xrightarrow{\mathcal{F}} \frac{1}{2\pi} X(j\omega) * Y(j\omega)$$

$$\cos(\omega_0 t) \xrightarrow{\mathcal{F}} \pi [\delta(\omega - \omega_0) + \delta(\omega + \omega_0)]$$

$$x(t) \xrightarrow{\mathcal{F}} X(j\omega)$$

$$\cos(2\pi 5t) \xrightarrow{\mathcal{F}} \pi [\delta(\omega - 10\pi) + \delta(\omega + 10\pi)]$$

$$Z(j\omega) = \pi [\delta(\omega - 10\pi) + \delta(\omega + 10\pi)] + \frac{0.5}{2\pi} [X(j\omega) * (\pi [\delta(\omega - 10\pi) + \delta(\omega + 10\pi)])]$$

$$= \pi [\delta(\omega - 10\pi) + \delta(\omega + 10\pi)] + \frac{1}{4} [X(j\omega) * \delta(\omega - 10\pi) + X(j\omega) * \delta(\omega + 10\pi)]$$

$$= \pi [\delta(\omega - 10\pi) + \delta(\omega + 10\pi)] + \frac{1}{4} [X(j(\omega - 10\pi)) + X(j(\omega + 10\pi))]$$

