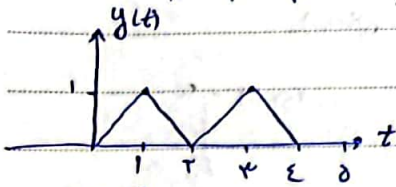


$$T=2 \quad \omega_0 = \frac{2\pi}{T} = \pi$$

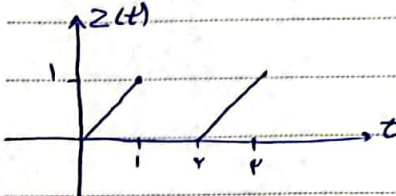
$$a_0 = 2 \quad a_{-1} = 1 \\ a_1 = 1$$

تقریب فوریاب صفر



$$T=2 \rightarrow \omega_0 = \pi$$

$$b_0 = 2 \quad b_{-1} = b_{-2} = -1 \\ b_1 = b_{-1} = 1$$



$$T=2 \rightarrow \omega_0 = \pi$$

$$z(t) = x(t)y(t) \rightarrow C_k = \sum_{L=-\infty}^{+\infty} a_L b_{k-L} = a_k \otimes b_k$$

$$a_k \otimes b_k \checkmark$$

فوریاب سری فوریاب  $C_k$  بویابا  
کانونیسی  $a_k \otimes b_k$  تسته ط

است

$$a_k = \frac{1}{T} \int_0^T x(t) e^{-j k \omega_0 t} dt$$

$$\frac{1}{T} \int_0^T x(t) e^{-j k \omega_0 t} dt = \frac{1}{T} \int_0^1 1 e^{-j k \omega_0 t} dt = \frac{1}{T} \left( \frac{-1}{j k \omega_0} e^{-j k \omega_0 t} \right)_0^1 = -\frac{1}{T j k \omega_0} (e^{-j k \omega_0} - 1)$$

$$b_k = \frac{1}{T} \int_0^T y(t) e^{-j k \omega_0 t} dt = \frac{1}{T} \int_0^1 0 e^{-j k \omega_0 t} dt + \frac{1}{T} \int_1^2 1 e^{-j k \omega_0 t} dt = \frac{1}{T} \int_1^2 e^{-j k \omega_0 t} dt$$

$\frac{d}{dt}$	$f$
$t$	$e^{-j k \omega_0 t}$
$1$	$\frac{-1}{j k \omega_0} e^{-j k \omega_0 t}$
$0$	$\frac{1}{(j k \omega_0)^2} e^{-j k \omega_0 t}$

$$\frac{1}{T} \left( \frac{-t}{j k \omega_0} e^{-j k \omega_0 t} - \frac{1}{(j k \omega_0)^2} e^{-j k \omega_0 t} \right)_0^1 + \frac{1}{T} \left( \frac{t-1}{j k \omega_0} e^{-j k \omega_0 t} + \frac{1}{(j k \omega_0)^2} e^{-j k \omega_0 t} \right)_1^2$$

$$x(t) = 2 + a_1 e^{j \pi t} + a_{-1} e^{-j \pi t} = 2 + e^{j \pi t} + e^{-j \pi t}$$

$\frac{d}{dt}$	$f$
$t$	$e^{-j k \omega_0 t}$
$1$	$\frac{-1}{j k \omega_0} e^{-j k \omega_0 t}$
$0$	$\frac{1}{(j k \omega_0)^2} e^{-j k \omega_0 t}$

$$y(t) = 2 + b_1 e^{j \pi t} + b_{-1} e^{-j \pi t} + b_2 e^{j 2 \pi t} + b_{-2} e^{-j 2 \pi t}$$

$$2 + e^{j \pi t} + e^{-j \pi t} - e^{j 2 \pi t} - e^{-j 2 \pi t}$$

$$2 + 2 \cos(\pi t) - 2 \cos(2 \pi t)$$

$$C_k = \sum_{L=-\infty}^{+\infty} a_L b_{k-L} = -\frac{1}{T j k \omega_0} \left( \frac{1}{j k \omega_0} (e^{-j k \omega_0} + 1) + \frac{1}{j k \omega_0} \right) \checkmark$$





$$u(t) \xrightarrow{\text{LTS}} z(t) \quad y(t) \xrightarrow{\text{LTS}} k(t)$$

$(h(t))$                        $(h(t))$

$$h(t) = e^{-\gamma t} u(t) \quad z(t) \xleftrightarrow{L} c_k \quad c_k = a_k H(jk\omega_0)$$

$$H(s) = \int_{-\infty}^{+\infty} h(t) e^{-st} dt = \int_0^{+\infty} e^{-\gamma t} e^{-st} dt = \int_0^{+\infty} e^{-t(s+\gamma)} dt = \left[ -\frac{1}{s+\gamma} e^{-t(s+\gamma)} \right]_0^{\infty} = \frac{1}{s+\gamma}$$

$$\frac{1}{s+\gamma} \quad u(t) = \begin{cases} 1 & 0 \leq t < T \\ 0 & t \geq T \end{cases} \quad T = \frac{1}{\omega_0}$$

$$z(t) = H(s) e^{st} = e^{st} \left( \frac{1}{s+\gamma} \right) = \frac{e^{st}}{s+\gamma} \quad c_k = a_k H(jk\omega_0)$$

$$H(s) = \frac{1}{s+\gamma}$$

$$k(t) = e^{st} \frac{1}{s+\gamma} = \frac{e^{st}}{s+\gamma}$$

$$a_k = \frac{1}{T} \int_0^T u(t) e^{-jk\omega_0 t} dt = \frac{1}{T} \int_0^T e^{-jk\omega_0 t} dt$$

$$a_k = \frac{1}{T} \left[ \frac{(-1)^k - 1}{-jk\omega_0} \right] = \frac{-(-1)^k}{jk\omega_0} + \frac{1}{jk\omega_0}$$

$$\begin{cases} 0 & k = \text{even} \\ \frac{1}{jk\omega_0} & k = \text{odd} \end{cases}$$

$$c_k = \sum_{k=-\infty}^{+\infty} a_k H(jk\omega_0) e^{jk\omega_0 t} \quad c_k = \sum_{k=-\infty}^{+\infty} \rightarrow$$

$$H(jk\omega_0) = \frac{1}{\gamma + jk\omega_0}$$

$$\frac{a_k}{\gamma + jk\omega_0} \rightarrow \frac{\gamma + \gamma \cos(\gamma t)}{\gamma + jk\omega_0} \quad \checkmark$$

ورودی  $u(t)$

$$\frac{b_k}{\gamma + jk\omega_0} = \frac{\gamma + \gamma \cos(\gamma t) - \gamma \cos(\gamma t)}{\gamma + jk\omega_0} \quad \checkmark$$

ورودی  $y(t)$

$$a_k = \begin{cases} \frac{1}{jk\omega_0 + \gamma} & k \neq 0 \\ 1 & k = 0 \end{cases} \quad b_k = \begin{cases} \frac{\gamma}{jk\omega_0 + \gamma} & k \neq 0 \\ 1 & k = 0 \end{cases} \quad \checkmark$$



نام و نام خانوادگی  
پرونده

پاسی  
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$x[n]$

$N=7$

۳. حقیقی و فرد

$$a_{10} = j \quad a_{14} = 2j \quad a_{16} = -2j$$

شایر فرائی

$$a_0 = a_N \rightarrow a_0 = a_7 \rightarrow a_1 = a_{N+1} \rightarrow a_{10} = j \quad a_1 = a_{-1}^* = j \rightarrow a_{-1}^* = a_{-1} = -j$$

$$a_{16} = a_{N+2} \rightarrow a_{14} = 2j \quad a_{16} = a_{N+2} = 2j \quad a_{16} = a_{-2}^* = 2j \rightarrow a_{-2}^* = a_{-2} = -2j$$

$$a_0 = 0 \quad \text{فرد است}$$

$$a_{16} = a_{-2}^* = 2j \rightarrow a_{-2}^* = a_{-2} = -2j$$

$$x[n] \rightarrow \boxed{LTS} \rightarrow y[n] \\ \downarrow \quad \downarrow \\ a_k \quad b_k$$

$$b_k = a_k \cdot H(e^{j\omega_k})$$

$$h[n] = \left(\frac{1}{2}\right)^n u[n] \quad H(z) = \sum_{k=-\infty}^{\infty} h[k] z^{-k}$$

$$h[n] = a_0 e^{j\frac{2\pi}{V}n} + a_{-1} e^{-j\frac{2\pi}{V}n} + a_1 e^{j\frac{4\pi}{V}n} + a_{-2} e^{-j\frac{4\pi}{V}n} + a_2 e^{j\frac{6\pi}{V}n} + a_{-3} e^{-j\frac{6\pi}{V}n} \\ j e^{j\frac{2\pi}{V}n} - j e^{-j\frac{2\pi}{V}n} + 2j e^{j\frac{4\pi}{V}n} - 2j e^{-j\frac{4\pi}{V}n} + 3j e^{j\frac{6\pi}{V}n} - 3j e^{-j\frac{6\pi}{V}n}$$

$$2 \sin\left(\frac{2\pi}{V}n\right) + 4 \sin\left(\frac{4\pi}{V}n\right) + 6 \sin\left(\frac{6\pi}{V}n\right)$$

$$H(z) = \sum_{k=-\infty}^{\infty} h[k] z^{-k} = \sum_{k=0}^{\infty} \left(\frac{1}{2}\right)^k z^{-k} = \sum_{k=0}^{\infty} \left(\frac{1}{2} z^{-1}\right)^k = \frac{1}{1 - \frac{1}{2} z^{-1}}$$

$$b_k = a_k \cdot \frac{1}{1 - \frac{1}{2} e^{-j\frac{2\pi}{V}k}} \quad \checkmark$$



وزارت معارف و اوقاف

دانشگاه صنعتی شاهرود



عباسعلی عباسی

کارشناسی مهندسی برق (روزانه)

شماره ملی: 2110886366

شماره دانشجویی: ۹۸۲۱۳۲۳



$$\frac{d}{dt} y(t) + 10y(t) = \int_{-\infty}^{+\infty} x(\tau) \delta(t-\tau) d\tau - x(t)$$

$$H(j\omega) \text{ و } y(t) \quad - ۱$$

$$z(t) = e^{-t} u(t) + 2\delta(t)$$

$$\xrightarrow{\mathcal{F}} (j\omega) Y(j\omega) + 10 Y(j\omega) = X(j\omega) \cdot Z(j\omega) - X(j\omega)$$

$$X(\omega) (Z(\omega) - 1)$$

برای راحتی  $j\omega = \omega$ 

$$H(\omega) = \frac{Y(\omega)}{X(\omega)} = \frac{Z(\omega) - 1}{\omega + 10}$$

$$Z(\omega) = ? \Rightarrow z(t) = e^{-t} u(t) + 2\delta(t) \xrightarrow{\mathcal{F}} \left[ \frac{1}{s+1} + 2 \right] = \left[ \frac{1}{1+j\omega} + 2 \right]$$

$$H(\omega) = \frac{1}{1+j\omega} - 2$$

$$\xrightarrow{j\omega = s} s = \frac{1}{s+1} - \frac{2(s+1)}{(s+1)} = \frac{1-2(s+1)}{s+1} = \frac{1-2s-2}{s+1} = \frac{-1-2s}{s+1}$$

$$\Rightarrow \frac{A}{s+1} + \frac{B}{s+10} \Rightarrow \frac{X-2s}{(s+1)(s+10)} = \frac{-1-2s}{(s+1)(s+10)}$$

$$A = (s+1)H(\omega) \Big|_{s=-1} = \frac{-1-2(-1)}{-1+10} = \frac{-1+2}{9} = \frac{1}{9} \quad \checkmark$$

$$B = (s+10)H(\omega) \Big|_{s=-10} = \frac{-1-2(-10)}{-10+1} = \frac{-1+20}{-9} = -\frac{19}{9}$$

$$\frac{1}{9} \frac{1}{s+1} - \frac{19}{9} \frac{1}{s+10} = \frac{1}{9} \left( \frac{1}{1+j\omega} \right) - \frac{19}{9} \left( \frac{1}{10+j\omega} \right) \xrightarrow{\mathcal{F}^{-1}} h(t) = \frac{1}{9} e^{-t} u(t) - \frac{19}{9} e^{-10t} u(t) \quad \checkmark$$



Subject :

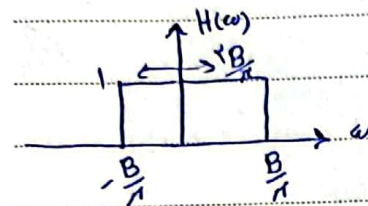
Date :

$$x(t) = \frac{\sin Bt}{\pi t} \rightarrow \frac{\sin(\pi \frac{Bt}{\pi})}{\pi t \frac{B}{\pi}} \cdot \frac{B}{\pi} = \frac{B}{\pi} \text{sinc}\left(\frac{Bt}{\pi}\right)$$

$$x(t) = \cos 2t + \cos 5t$$

$$\frac{B}{\pi} \rightarrow \frac{t \text{sinc}\left(\frac{Wt}{\pi}\right)}{Z = \frac{2B}{\pi W}}$$

$H(\omega) = \text{سبب فرکانس}$   $\xrightarrow{\mathcal{L}}$   $\text{بالس تکي}$   
 $\text{مستعار}$



$$X(t) = \frac{1}{\pi} e^{j\pi t} + \frac{1}{\pi} e^{-j\pi t} + \frac{1}{\pi} e^{j5t} + \frac{1}{\pi} e^{-j5t} \xrightarrow{\mathcal{L}} \frac{1}{\pi} \times \frac{1}{-j\pi + j\omega} + \frac{1}{\pi} \times \frac{1}{j\pi + j\omega} + \frac{1}{\pi} \times \frac{1}{-j5 + j\omega} + \frac{1}{\pi} \times \frac{1}{j5 + j\omega}$$

$$E_{\infty} = \int_{-\infty}^{+\infty} |x(t)|^2 dt = \frac{1}{\pi} \int_{-\infty}^{+\infty} |X(\omega)|^2 d\omega$$

صديق رابطه پاراول داريم:

$$H(\omega) = \frac{Y(\omega)}{X(\omega)} \rightarrow Y(\omega) = H(\omega) \cdot X(\omega) \xrightarrow{\mathcal{L}} y(t) = x(t) * h(t)$$

$$\frac{\sin Bt}{\pi t} * \cos 2t + \frac{\sin Bt}{\pi t} * \cos 5t$$

$$\int_{-\infty}^{+\infty} \cos 2t \frac{\sin(Bt)}{\pi t} + \int_{-\infty}^{+\infty} \cos 5t \frac{\sin(Bt)}{\pi t}$$

دانشگاه صنعتی شاهرود

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