29-3-2021

Evidencia 1.7

Martínez Coronel Brayan Yosafat

$$f(t) = \begin{cases} e^{-t} & 0<t<\pi \\ -e^{t} & -\pi<t<0 \end{cases} \qquad T = 2\pi \qquad \omega_0 = 1$$

$$C_n = \frac{1}{2\pi}\int_{-\pi}^{\pi} f(t)\, e^{-int}\, dt = \frac{-1}{2\pi}\int_{-\pi}^{0} e^{t(1-in)}\, dt + \frac{1}{2\pi}\int_{0}^{\pi} e^{-t(1+in)}\, dt$$

$$= \frac{1}{2\pi}\left[\frac{-e^{(1-in)t}}{(1-in)}\Bigg|_{-\pi}^{0} - \frac{e^{-(1+in)t}}{(1+in)}\Bigg|_{0}^{\pi} \right] \qquad e^{0} = 1$$

$$= \frac{1}{2\pi}\left[\frac{-1}{1-in} + \frac{e^{-(1-in)\pi}}{1-in} - \frac{e^{-(1+in)\pi}}{1+in} + \frac{1}{1+in} \right]$$

$$= \frac{1}{2\pi(1+n^2)}\left[-(\cancel{1}+in) + (1+in)e^{-(1-in)\pi} - (1-in)e^{-(1+in)\pi} + (\cancel{1}-in) \right]$$

$$= \frac{1}{2\pi(1+n^2)}\left[-2in + (1+in)e^{-\pi}(\cos n\pi + i\,\cancel{\operatorname{sen} n\pi}^{\,0}) - \frac{(1-in)}{e^{\pi}}(\cos n\pi + i\,\cancel{\operatorname{sen}(-n\pi)}^{\,0}) \right]$$

$$= \frac{1}{2\pi(1+n^2)}\left[-2in + \frac{\cancel{1}+in}{e^{\pi}}(\cos n\pi) - \frac{\cancel{1}-in}{e^{\pi}}(\cos n\pi) \right]$$

$$= \frac{1}{\pi(1+n^2)}\left[-in + \frac{in}{e^{\pi}}\cancel{\cos n\pi}^{\,(-1)^n} \right] = \frac{in}{\pi(1+n^2)}\left(-1 + \frac{(-1)^n}{e^{\pi}} \right)$$

no se indetermina

$n\omega_0$	$\lvert C_n \rvert$
-4	0.0716
-3	0.0996
-2	0.1218
-1	0.1660
0	0
1	0.1660
2	0.1218
3 4	0.0996