Le2

Tuesday, 28 February 2023 21:35

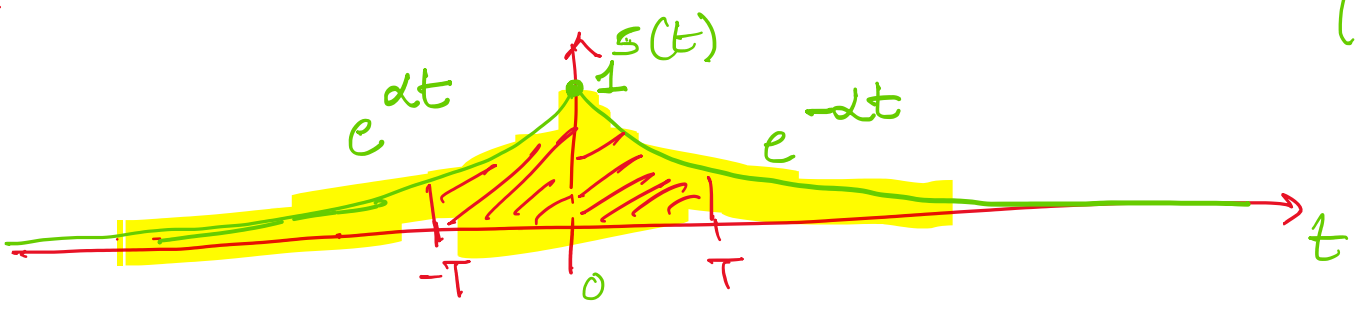
ES SI CALCOLI AREA E VALOR MEDIO DEL SEGNALE

$$A_s = \text{area}(s) = \lim_{T\to\infty} \int_{-T}^{T} \frac{1(t)}{1(t)}\,dt = \lim_{T\to\infty} \int_{0}^{T} 1\,dt = \lim_{T\to\infty} T = +\infty$$

$$m_s = \lim_{T\to\infty} \frac{\int_{-T}^{T} s(t)\,dt}{2T} = \lim_{T\to\infty} \frac{1}{2} = \frac{1}{2}$$

ES $s(t) = e^{-\alpha|t|}$ $\alpha > 0$

$$s(t) = \begin{cases} e^{-\alpha t} & t>0 \\ e^{\alpha t} & t<0 \end{cases}$$



$$A_s = \lim_{T\to\infty} 2\int_{0}^{T} e^{-\alpha t}\,dt = \lim_{T\to\infty} 2\int_{0}^{T} e^{-\alpha t}\,dt$$

$$\int e^{-\alpha t}\,dt = \frac{e^{-\alpha t}}{-\alpha}\Big]_0^T$$

$$= \lim_{T\to\infty} \frac{2}{-\alpha}\left(e^{-\alpha T} - e^{-\alpha\cdot 0}\right) \quad (e^{-\alpha\cdot 0} = 1)$$

$$= \lim_{T\to\infty} \frac{2}{\alpha}\left(1 - e^{-\alpha T}\right) = \frac{2}{\alpha}$$

($e^{-\alpha T} \to 0$)

$$m_s = \lim_{T\to\infty} \frac{\int_{-T}^{T} s(t)\,dt}{2T} = \lim_{T\to\infty} \frac{\frac{2}{\alpha}\left(1-e^{-\alpha T}\right)}{2T} = 0$$

ES ENERGIA E POTENZA DI $s(t) = 1(t)$

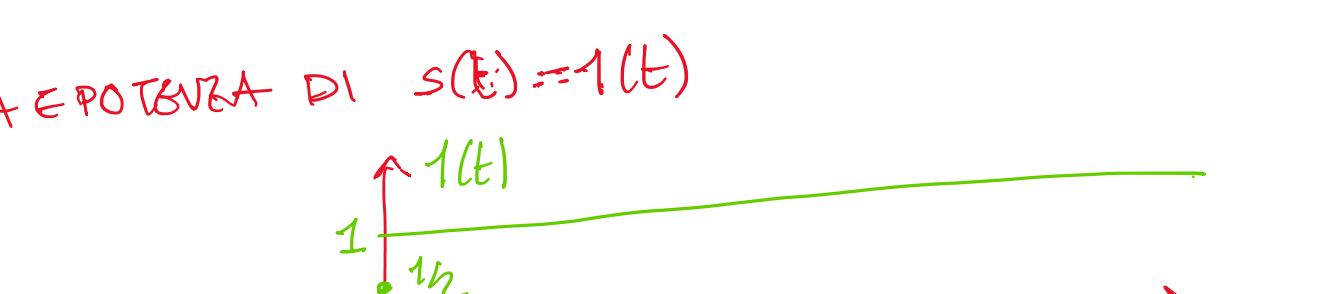
$$|s(t)|^2 = |1(t)|^2 = (1(t))^2 = \begin{cases} 1 & t>0 \\ 1/4 & t=0 \\ 0 & t<0 \end{cases} \sim 1(t)$$

$|s(t)|^2 = 1(t)$

$$E_s = A_1 = +\infty$$

$$P_s = m_1 = 1/2$$

ES $s(t) = e^{-\alpha|t|}$, $\alpha > 0$



$$|s(t)|^2 = \begin{cases} e^{-2\alpha t} & t>0 \\ 1 & t=0 \\ e^{2\alpha t} & t<0 \end{cases} = e^{-2\alpha|t|} = e^{-\beta|t|}$$

$\beta = 2\alpha > 0$

$$E_s = \frac{2}{2\alpha} = \frac{1}{\alpha}$$

$$P_s = 0$$