Le22

Thursday, 9 May 2024 08:49

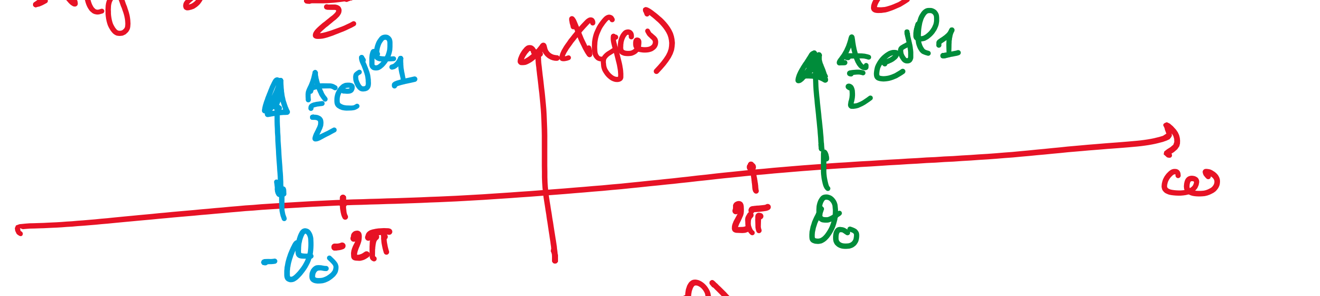
Es 1d $s(n) = A\cos(n\theta_0 + \theta_1) = \frac{A}{2}e^{j\theta_1} e^{jn\theta_0} + \frac{A}{2}e^{-j\theta_1} e^{-jn\theta_0}$

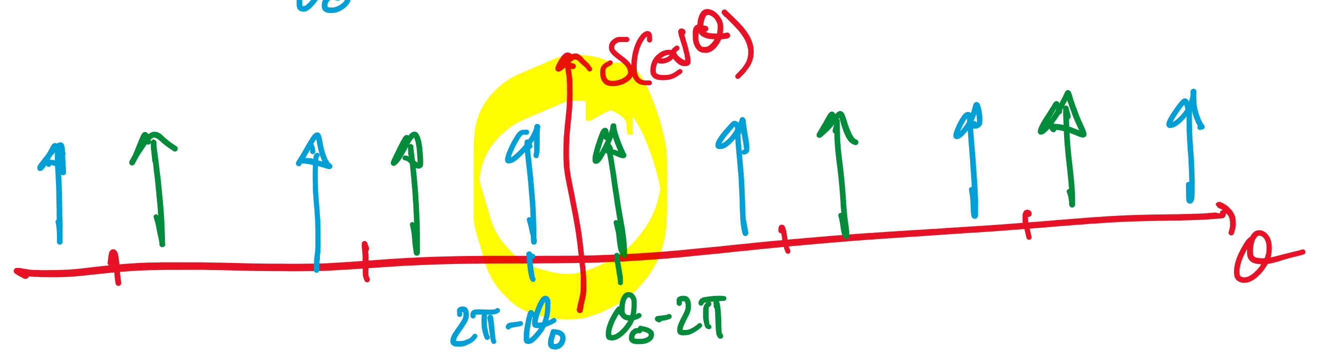
$S(e^{j\theta}) = ?$

$s(n) = x(t)\big|_{t=n}$

$$\begin{tikzcd} x(t)=A\cos(\theta_0 t+\theta_1) \arrow[r] \arrow[d, "\mathcal{F}"] & \boxed{\downarrow} \arrow[r] & s(n)=A\cos(\theta_0 n+\theta_1) \arrow[d, "\mathcal{F}"] \\ X(j\omega) \arrow[r] & \boxed{rep_{2\pi}} \arrow[r] & S(e^{j\theta}) \end{tikzcd}$$

$X(j\omega) = \frac{A}{2}e^{j\theta_1}\delta(\omega-\theta_0) + \frac{A}{2}e^{-j\theta_1}\delta(\omega+\theta_0)$

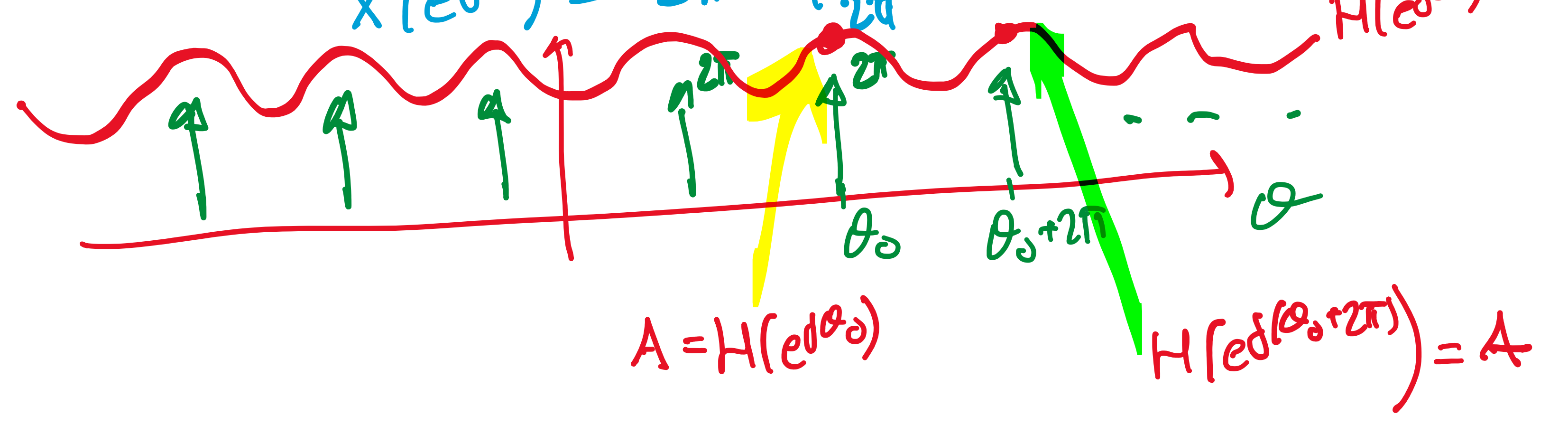




ES DIMOSTRARE CHE I SEGNALI $x(n) = e^{jn\theta_0}$ SONO AUTOFUNZIONI DEI FILTRI DISCRETI

$$\begin{tikzcd} x(n) \arrow[r] \arrow[d, "\mathcal{F}"] & \boxed{h(\cdot)} \arrow[r] & y(n)=\lambda x(n) \arrow[d, "\mathcal{F}"] \\ X(e^{j\theta}) \arrow[r] & \otimes \arrow[r] & Y(e^{j\theta}) \\ & H(e^{j\theta}) \arrow[u] & \end{tikzcd}$$

$X(e^{j\theta}) = 2\pi \, rep_{2\pi}\, \delta(\theta-\theta_0)$



$Y(e^{j\theta}) = \underbrace{H(e^{j\theta_0})}_{\text{COSTANTE}} X(e^{j\theta})$

$y(n) = H(e^{j\theta_0})\, x(n)$

$$\boxed{e^{jn\theta_0} \longrightarrow \boxed{h(\cdot)} \longrightarrow H(e^{j\theta_0})\cdot e^{jn\theta_0}}$$

ES I FILTRI REALI NON DISTORCONO LE SINUSOIDI

$x(n) = \cos(n\theta_0+\theta_1) \longrightarrow \boxed{h(\cdot) \text{ REALE}} \longrightarrow y(n) = ?$

$x(n) = \frac{e^{j\theta_1}}{2} e^{jn\theta_0} + \frac{e^{-j\theta_1}}{2} e^{-jn\theta_0}$

SIMM. HERMITIANA

$$y(n) = \frac{e^{j\theta_1}}{2} H(e^{j\theta_0})\, e^{jn\theta_0} + \frac{e^{-j\theta_1}}{2} \cancel{H(e^{-j\theta_0})}\, e^{-jn\theta_0}$$

$H^*(e^{j\theta_0})$

$= Re\left[H(e^{j\theta_0})\, e^{j(n\theta_0+\theta_1)}\right]$

$= Re\left[|H(e^{j\theta_0})|\, e^{j\angle H(e^{j\theta_0})}\, e^{j(n\theta_0+\theta_1)}\right]$

$= |H(e^{j\theta_0})| \cos\left(n\theta_0+\theta_1+\angle H(e^{j\theta_0})\right)$

$$\boxed{\cos(n\theta_0+\theta_1) \longrightarrow \boxed{h(\cdot) \text{ REALE}} \longrightarrow |H(e^{j\theta_0})| \cos(n\theta_0+\theta_1+\angle H(e^{j\theta_0}))}$$