FPS TP 10Nov 2021

TP

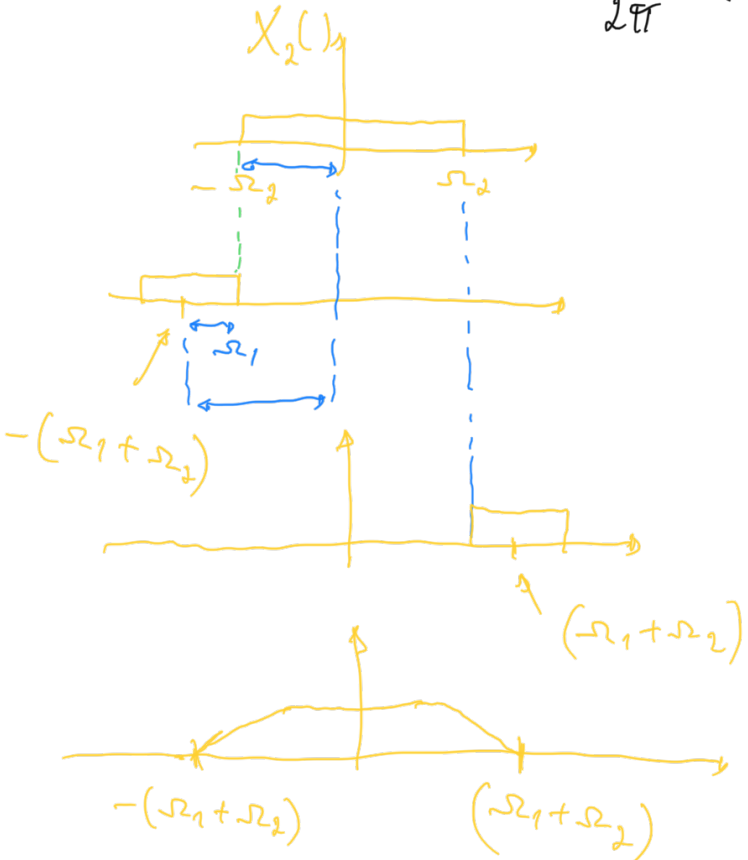
EX 1

$x_1(t) \longleftrightarrow X_1(\Omega)$

$x_2(t) \longleftrightarrow X_2(\Omega)$

a) $x_1(t)+x_2(t)$ $\quad \therefore \Omega_A > 2\,MAX(\Omega_1, \Omega_2)$

b) $x_1(t) \times x_2(t) \xleftrightarrow{\mathcal{F}} \frac{1}{2\pi} X_1(\Omega) * X_2(\Omega)$



$\Omega_A > 2(\Omega_1+\Omega_2)$

c) $x_1(t) * x_2(t) \xleftrightarrow{\mathcal{F}} X_1(\Omega) X_2(\Omega)$

$\therefore \Omega_A > 2\ MIN(\Omega_1, \Omega_2)$

2.

$$x_c(t) = 1 - \sin 200\pi t + \cos 700\pi t$$

$$x[n] = x_c(t)\Big|_{t=nT=\frac{n}{F_s}}$$

$$= 1 - \sin 200\pi \frac{n}{600} + \cos 700\pi \frac{n}{600}$$

$$= 1 - \sin n\frac{2\pi}{6} + \cos n\frac{7\pi}{6}$$

$\omega_0 = 0$ rad $\quad \omega_1 = \frac{\pi}{3}$ rad $\quad \omega_2 = \frac{7\pi}{6}$

$|\omega_0| < \pi$ ✓

$|\omega_1| < \pi$ ✓

$|\omega_2| > \pi \Rightarrow \omega_2 = \frac{7\pi}{6} + K2\pi = \frac{7\pi + K12\pi}{6}\Big|_{K=-1}$

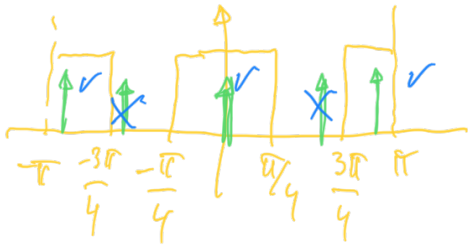
$= -\frac{5\pi}{6} \quad > -\pi \wedge < \pi$

$K = -1$

$$\omega_2 = -\frac{\omega}{6}$$

$$x[n] = 1 - \sin n\frac{\pi}{3} + \cos\left(-n\frac{5\pi}{6}\right)$$

$$= 1 - \sin n\frac{\pi}{3} + \cos n\frac{5\pi}{6}$$



$$y[n] = 1 + \cos n\frac{5\pi}{6}$$

$$y[n] = y_c(t)\Big|_{t=\frac{n}{F_s}}$$

$$= 1 + \cos\frac{n}{F_s}\,\frac{5\pi}{6}F_s$$

$$= 1 + \cos 500\pi t\Big|_{t=\frac{n}{F_s}}$$

$$\therefore\quad y_c(t) = 1 + \cos 500\pi t$$

assuming ideal reconstruction conditions

it is not correct ~~to~~ write:

$$y_c(t) = y[n]\Big|_{n=tF_s}$$

WRONG!