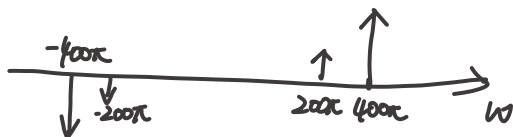


例 8.4 $x(t) = \sin 200\pi t + 2\sin 400\pi t$

$$X(j\omega)$$



$$F[g(t)] = \frac{1}{2\pi} (\delta(\omega - 400\pi) - \delta(\omega + 400\pi)) * X(j\omega)$$

$$F[\sin^2 400\pi t] = \frac{\pi}{j} (\delta(\omega - 400\pi) - \delta(\omega + 400\pi))$$

$$y = F[x(t) \sin^2 400\pi t]$$

$$= \frac{1}{2\pi} X(j\omega) * F[\sin^2 400\pi t]$$

$$= \frac{1}{2\pi} X(j\omega) * \frac{1}{2\pi} \frac{\pi}{j} (\delta(\omega - 400\pi) - \delta(\omega + 400\pi))$$

$$* \frac{\pi}{j} (\delta(\omega - 400\pi) - \delta(\omega + 400\pi))$$

$$= \frac{1}{4} (-1) X(j\omega) * [\delta(\omega - 800\pi) - \delta(\omega) - \delta(\omega) + \delta(\omega + 800\pi)]$$

$$= -\frac{1}{4} X(j\omega) *$$

$$= -\frac{1}{4}$$

~~X~~ 频域·易错!!!

$$x(t) \sin^2(400\pi t)$$

$$= x(t) \frac{1 - \cos 800\pi t}{2}$$

$$= (\sin 200\pi t + 2\sin 400\pi t) \frac{1 - \cos 800\pi t}{2}$$

$$= \frac{1}{2} \sin 200\pi t + \sin 400\pi t - \frac{1}{2} \sin 200\pi t \cos 800\pi t$$

$$- \sin 400\pi t \cos 800\pi t$$

$$= \frac{1}{2} \sin 200\pi t + \sin 400\pi t - \frac{1}{2} \frac{e^{j200\pi t} - e^{-j200\pi t}}{2j} \frac{e^{j800\pi t} + e^{-j800\pi t}}{2}$$

$$- \frac{e^{j400\pi t} - e^{-j400\pi t}}{2j} \cdot \frac{e^{j800\pi t} + e^{-j800\pi t}}{2}$$

$$= \frac{1}{2} \sin 200\pi t + \sin 400\pi t - \frac{1}{2} \frac{e^{j1000\pi t} + e^{j600\pi t} - j^{600\pi t} + e^{-j^{600\pi t}}}{2j \cdot 2}$$

$$= \frac{1}{2} \sin 200\pi t + \sin 400\pi t - \frac{1}{2} (\sin 1000\pi t + \sin 600\pi t)$$

$$- (\sin 1200\pi t + \sin (-400\pi t))$$

是 $400\pi \rightarrow y(t) = \sin(200\pi t)$

例 8.8 (1) $y(t) = [x(t) * h(t)] \cos \omega_c t$
 $+ x(t) \sin \omega_c t$

$$H(j\omega) = \begin{cases} -j & \omega > 0 \\ j & \omega < 0 \end{cases} = -j \operatorname{sgn}(\omega)$$

$$\begin{aligned} A(j\omega) &= X(j\omega) \cdot H(j\omega) \\ &= X(j\omega) (-j) \operatorname{sgn}(\omega) \end{aligned}$$

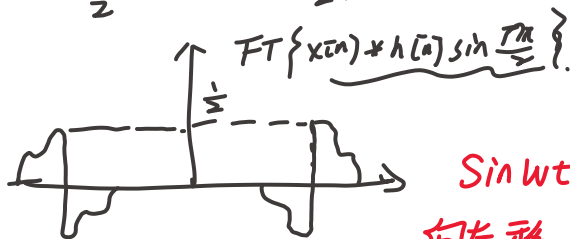
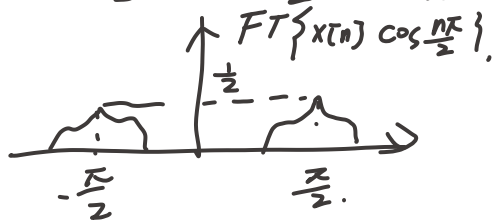
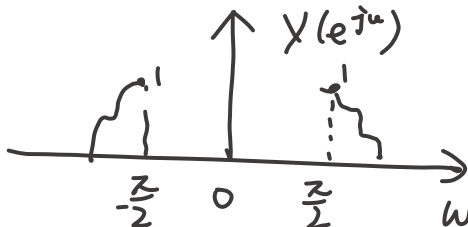
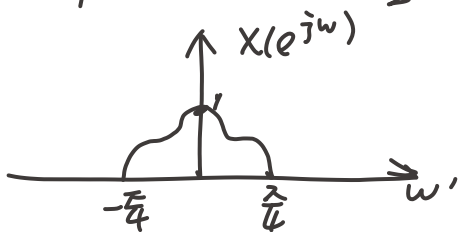
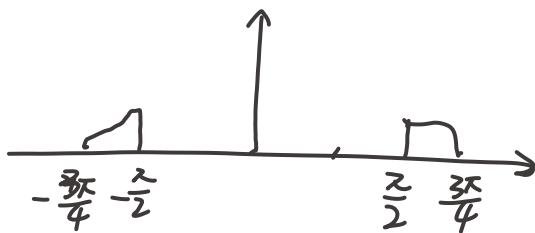
$$A^*(j\omega) = X^*(j\omega) (tj) \operatorname{sgn}(-\omega).$$

$$= \frac{X^*(-j\omega)}{= X(j\omega)} \frac{(-j) \cdot \operatorname{sgn}(\omega)}{\text{奇函数}} = A(\omega)$$

∴ 先求对称 实信号 $y(t)$

(2) ω_c 理想低通.

818 $X(e^{j\omega})$ 序列带限于 $\frac{\pi}{4}$



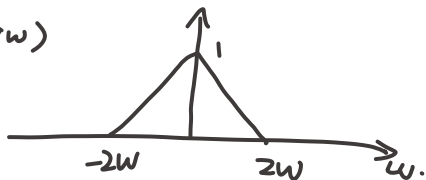
$\sin \omega t$

向左移 $(\frac{\pi}{2})$

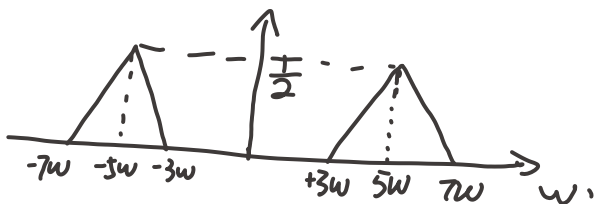
向右移 $(-\frac{\pi}{2})$

$$H(e^{j\omega}) \begin{cases} j & 0 < \omega \leq \frac{\pi}{4} \\ -j & -\frac{\pi}{4} \leq \omega < 0 \end{cases}$$

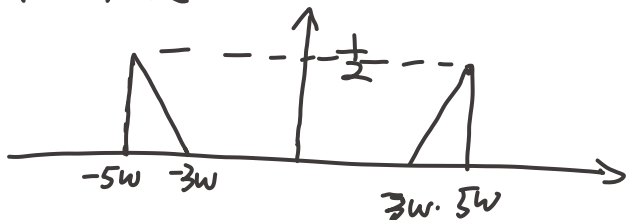
例 8.22 $x(t) \rightarrow X(j\omega)$



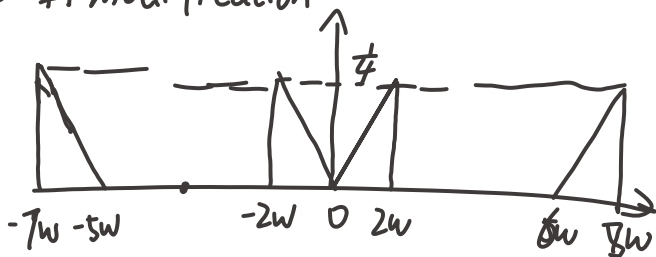
① 调制 $\cos 5\omega t$



② 带通滤波



③ 再modification



④ 低通

