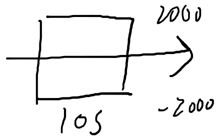
TFW HW4 P10942A05 鄭閔軒

1. 6 signal $-2000 \sim 2000$ Hz 10 sec



120000

$f \in [200000-200t, 210000-200t]$

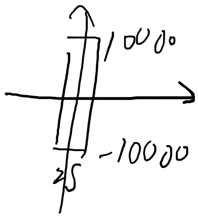
$0 < t < 12$

$f \in [-210000+200t, -200000+200t]$

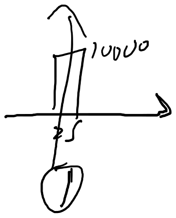
120000

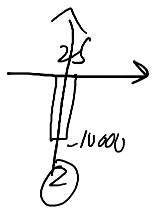
X6 Signal

將信號做 Dilation $(a=0.2)$



以 $f=0$ 做拆分成兩信號





將 ① 信號乘上 $a<0$ $(a=-200)$

將 ② 信號乘上 $a>0$ $(a=200)$

再將 6 組信號位移至

1、0-2 (s) ①②皆向右移1，①向上200000 $e^{j400000\pi t}x(t-1)$ ②向下200000 $e^{-j400000\pi t}x(t-1)$

2. 2-4 (s) ①②右移3 ①向上199600 $e^{j399200\pi t}x(t-3)$ ②向下199600 $e^{-j399200\pi t}x(t-3)$

3 4-6 (s) ①②右5 ①向上199200 $e^{j398400\pi t}x(t-5)$ ②向下199200 $e^{-j398400\pi t}x(t-5)$

4 6-8 (s) ①②右7 ①向上198800 $e^{j397600\pi t}x(t-7)$ ② 下 198800 $e^{-j397600\pi t}x(t-7)$

5 8-10 (s) ①②右9 ①向上198400 $e^{j396800\pi t}x(t-9)$ ② 下 198400 $e^{-j396800\pi t}x(t-9)$

6 10-12 (s) ①②右11 ①向上198000 $e^{j396000}x(t-11)$ ② 下 198000 $e^{-j396000\pi t}x(t-11)$

2. (i) $\exp(j10\pi t)\,x(t)$

Due to (i) only vertical shifting (ii) will be a chirp

(iii) will rotation (iv) convolution with chirp

we selected (i) is a stationary random process

3、(1) The difference of IMF and sinusoid function

The frequency and amplitued is fix in sinusoid funtion

IMF is more flexable, not fixed amplitud and frequency

(2) (ii) is an IMF fixed amplitude and not fixed amplitude

and local minimum add maximum would close to zero.

× (i) local minimum add maximum not near to zero.

4、(a) signal modulation 我們可利用Gabor Transform去查看可放置信號之位置，若用WDF會有cross term之問題

(b) random process analysis 可利用WDF 因 WDF之期望值為 Auto-covariance function 對其從 $+\infty \sim -\infty$ 做積分可得 Power Spectral density

(c) climate data analysis 適合 HHT 因可分析出頻域外信號的上升或下降趨勢

(d) signal sampling 因信號取樣時有可能遇到交疊信號，所以利用 Gabor transform 為佳

5. (a) Very fast and easy implement

(b)
1 16 1
2 8 1 8 -1
3 4 1 4 -1 8 0
4 8 0 4 1 4 -1
5 2 1 2 -1 1 2 0
6 4 0 2 1 2 -1 8 0
7 8 0 2 1 2 -1 2 0

7th row

[0 0 0 0 0 0 0 0 1 1 -1 -1 0 0]

6. (a) vanish moment 越高，則 mother wavelet 越偏向高頻分析高頻成份效果越佳

(b) $x(t) \begin{cases} 1+at+bt^2 & \text{for } -2<t<2 \\ 0 & \text{otherwise} \end{cases}$ $x(t)$ vanish moment $=2$

$$\int_{-2}^{2} x(t)\, dt = \frac{b}{3}t^3 + \frac{a}{2}t^2 + t \Big|_{-2}^{2} = 0 \quad — ①$$

$$\int_{-2}^{2} t\, x(t)\, dt = \frac{b}{4}t^4 + \frac{a}{3}t^3 + \frac{t^2}{2} \Big|_{-2}^{2} = 0 \quad — ②$$

$$\frac{8}{3}b + 2a + 2 - \left(-\frac{8}{3}b + 2a - 2\right) = 0$$

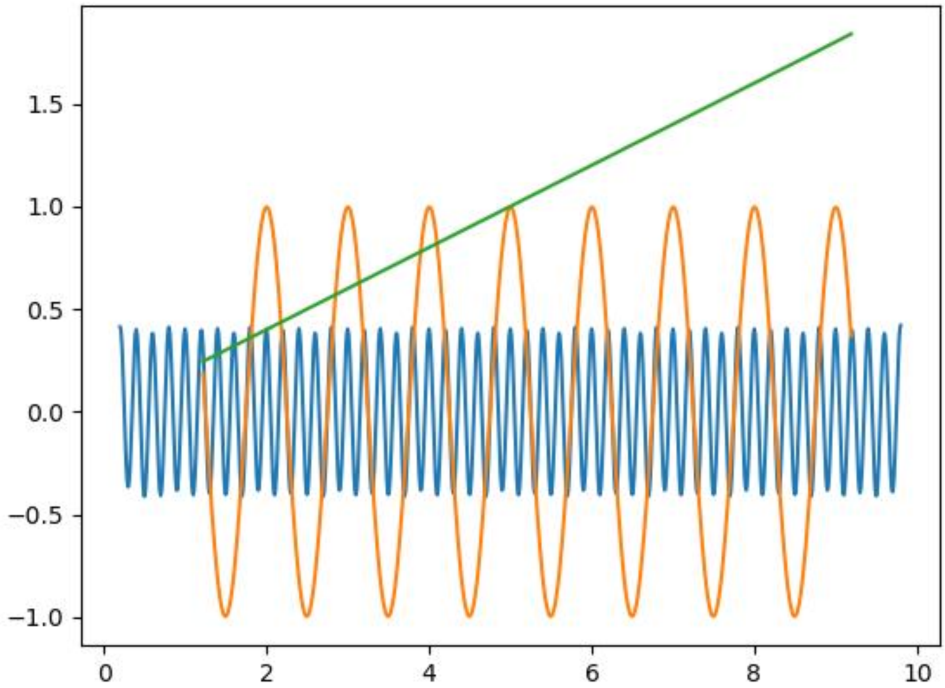
$$\frac{16}{3}b + 4 = 0 \qquad \underline{b = -4 \times \frac{3}{16} = -\frac{3}{4}} \ \#$$

$$4b + \frac{8}{3}a + 2 - \left(4b - \frac{8}{3}a + 2\right) = 0$$

$$\frac{16}{3}a = 0 \qquad \underline{a = 0} \ \#$$

上課加分 (0,5)：$a = 1.9143$

7.



The three component of HHT transform