

Homework#2

Assuming the following waveform

$$\begin{cases} 5 \sin(\omega t + \frac{\pi}{6}) & t < 0.1 \\ 10 \sin(\omega t + \frac{\pi}{6}) & t \geq 0.1 \end{cases}$$

f=60 Hz, and sampling frequency is 12 samples per cycle.

- Estimate the amplitude of the signal using Full-cycle Fourier algorithm
- Estimate the amplitude of the signal using Least Square algorithm (12 samples)
- Add second harmonic to the signal

$$\begin{cases} 5 \sin(\omega t + \frac{\pi}{6}) + 3 \sin(2\omega t + \frac{\pi}{6}) & t < 0.1 \\ 10 \sin(\omega t + \frac{\pi}{6}) + 3 \sin(2\omega t + \frac{\pi}{6}) & t \geq 0.1 \end{cases}$$

and repeat a and b (in this case Least Square algorithm considers second harmonics).

- Draw frequency response of Cosine filter of Full-cycle Fourier Algorithm with 12 samples per cycle (hint: in the class notes frequency response of Sine filter of Full-cycle Fourier algorithm is calculated)