MATLAB Assignment 7

Spring 2019, Section B

In this assignment, you will reinforce what we did in lecture today regarding MATLAB's filter toolbox. This assignment is due in two weeks. Please submit this homework as a *.m* file, with suppressed output. Remember that all lectures and homeworks may be found at *github.com/guybaryosef/ECE210-materials*. Homework is due on ——— to guybymatlab@gmail.com.

For each of the following questions, generate filters using either *fdatool* or the filter design toolbox in the signal processing toolbox. Apply the filter to the signal using *filter*. Lastly, plot the Fourier Transform of the final result using *fft* and *plot*. Refer to the notes for the proper way to use *fft* and obtain the proper scaling.

1. Generate a signal that consists of a sum of sine waves of frequencies 1 to 50 kHz. Set t to be from 0 to 2 seconds, using an interval of 0.001s.

$$signal = \sum_{f=1}^{50000} sin(2\pi f t)$$

2. Create a Butterworth lowpass filter with a sampling frequency of Fs = 100 kHz, a passband frequency of Fpass = 10 kHz, a stopband frequency of Fstop = 20 kHz, a passband attenuation of Apass = 5dB, and a stopband attenuation of Astop = 50dB.

3. Create a Chebychev I highpass filter with a sampling frequency of Fs = 100 kHz, a passband frequency of Fpass = 35 kHz, a stopband frequency of Fstop = 15 kHz, a passband attenuation of Apass = 2dB, and a stopband attenuation of Astop = 40dB.

4. Create a Chebychev II bandstop filter with a sampling frequency of Fs = 100 kHz, a passband frequency of below the frequency Fpass1 = 5 kHz and above Fpass2 = 45 kHz, a stopband frequency of between Fstop1 = 15 kHz Fstop2 = 35kHz, a passband attenuation of Apass = 5dB, and a stopband attenuation of Astop = 50dB.

4. Create a Elliptic bandpass filter with a sampling frequency of Fs = 100 kHz, a stopband frequency of below the frequency Fstop1 = 15 kHz and above Fstop2 = 35 kHz, a passband frequency of between Fpass1 = 20 kHz Fpass2 = 30 kHz, a passband attenuation of Apass = 5dB, and a stopband attenuation of Astop = 50dB.