## Removing Power Line Interference of 60Hz Using FIR Notch Filter

clc;

clear all;

close all;

%Loaded ECG Signal

load('100m.mat')

%Removing Gain and Base

ECGsignal\_original = (val -1024)/100;

Fs = 200;

f1 = 60;

t = (0:length(ECGsignal\_original)-1)/Fs;

%Generating Noise for f1 = 50 Hz

N= 0.1\*cos (2\*pi\*f1\*t);

%Adding Noise to ECG signal

ECG\_Noise = ECGsignal\_original + N;

%FIR Notch Filter Designing

b = [1 0.618 1];

a = 1;

%Making the Gain = 1

b = b/sum(b);

%Transfer Function of the filter

t1 = tf(b,a,(1/Fs))

[z,p,k] = tf2zpk(b,a);

%pole zero plot

zplane(z,p)

grid on

%Plotting the frequency response and group delay for the filter

L = length(ECGsignal\_original);

freqz(b,a,L,Fs);

[Gd,f] = grpdelay(b,a,L,Fs);

plot(f,abs(Gd))

title('Group Delay')

xlabel('Frequency(F)')

ylabel('Magnitude')

grid on

%Plotting the signals

figure(2)

ECG\_Filtered = filter(b,a,ECG\_Noise);

subplot(311);

plot(t,ECGsignal\_original)

xlabel('time(s)')

ylabel('Amplitude (mV)')

title('Raw ECG Signal')

grid on

subplot(312)

plot(t,ECG\_Noise)

xlabel('time(s)')

ylabel('Amplitude (mV)')

title('Noisy ECG Signal')

grid on

subplot(313)

plot(t,ECG\_Filtered)

xlabel('time(s)')

ylabel('Amplitude (mV)')

title('Reconstructed ECG Signal')

subplot(3,1,3)

xlim([0.0 18.0])

ylim([-13.6 -6.4])

grid on