## Removing Power Line Interference of 50Hz Using IIR Notch Filter

clc;

clear all;

close all;

%Loaded ECG Signal

load('100m.mat')

%Removing the Base and Gain from ECG Signal

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

Fs = 360;

%Frequency of PowerLine Interference

f1 = 50;

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;

% Designing\_IIR\_Notch\_Filter\_using\_coefficient

num = 0.957\*[1 -1.2844 1];

den = [1 -1.2291 0.914];

sys = tf(num,den);

[Z,P,K] = tf2zp(num,den)

%Freq response of filter

[H,w]=freqz(num,den);

plot(w/max(w),20\*log(abs(H)),LineWidth=1.5)

xlabel('Normalized Frequency')

ylabel('Magnitude (dB)')

title('Frequency Response for 50Hz Notch Filter (wc = 0.278\*pi)')

grid on

%Pole Zero plot of filter

zplane(num,den);

title('Pole Zero plot for 50Hz Notch Filter')

grid on

%Reconstructed ECG Signal using Designed Filter

ecg\_recons = filter(num,den,ECG\_Noise);

subplot(3,1,1)

plot(t,ECGsignal\_original)

xlabel('time(s)')

ylabel('Amplitude (mV)')

title('Raw ECG Signal')

grid on

subplot(3,1,2)

plot(t,ECG\_Noise)

xlabel('time(s)')

ylabel('Amplitude (mV)')

title('ECG Signal with 50 Hz Noise')

grid on

subplot(3,1,3)

plot(t,ecg\_recons)

xlabel('time(s)')

ylabel('Amplitude (mV)')

title('Filtered Signal from 50Hz Noise')

grid on