

Removing Electrode Motion Artifacts Using Butterworth Highpass 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
L = length(ECGsignal_original);
t = (1:L)/Fs;

%Defining Cutoff Frequency and order
fc = 5;
n = 2;
[b,a] = butter(n,fc/(Fs/2),'high');
t1 = tf(b,a,1/Fs)
```

```
t1 =

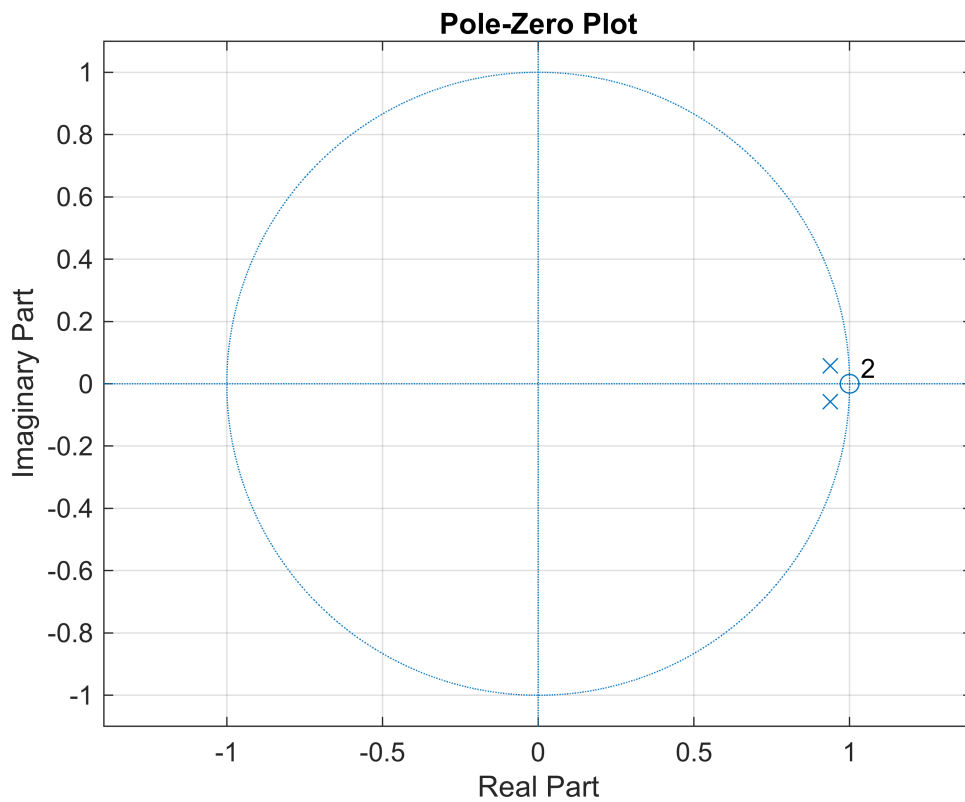
    0.9402 z^2 - 1.88 z + 0.9402
    -----
           z^2 - 1.877 z + 0.8839

Sample time: 0.0027778 seconds
Discrete-time transfer function.
Model Properties
```

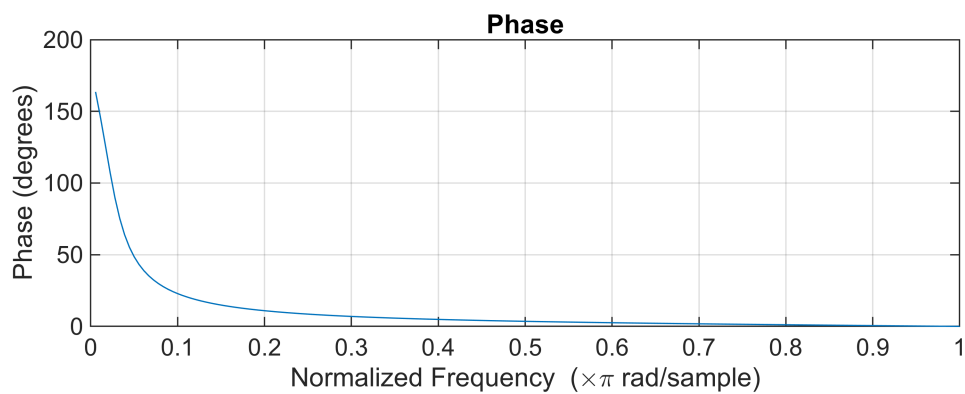
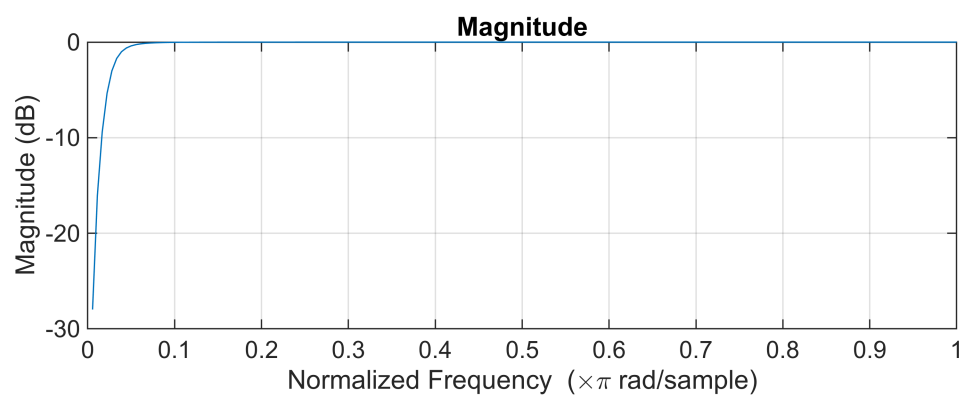
```
[z,p,k] = tf2zp(b,a)
```

```
z = 2×1
    1
    1
p = 2×1 complex
    0.9384 + 0.0581i
    0.9384 - 0.0581i
k = 0.9402
```

```
zplane(z,p,k)
grid on
```



```
w = 0:2*pi/Fs:pi;
freqz(b,a,w)
```



```

%Reconstructing the signal
ECG_filtered = filter(b,a,ECGsignal_original);
subplot(211)
plot(t,ECGsignal_original)
title('ECG Signal with Artifacts')
xlabel('time(s)')
ylabel('Amplitude(mV)')
xlim([0.00 2.23])
ylim([-11.18 -8.81])
grid on
subplot(212)
plot(t,ECG_filtered)
title('ECG Signal without Artifacts')
xlabel('time(s)')
ylabel('Amplitude(mV)')
xlim([0.00 2.16])
ylim([-2.0 5.0])
grid on

```

