```
%Transfer Function Analysis for Band-Pass 2 6th Order Butterworth
 Filter
%ECE223 Sp19, Jennifer Jordan & David Lay

s = tf('s');
x = (1.0759*((s/39885.9)+(39885.9/s))); %LP to BP transformation
 condition
H = 1/((x^2+.5176*x+1)*(x^2+1.4142*x+1)*(x^2+1.9319*x+1))
%Figures:
figure(1);
bode(H);
title('Band-Pass 2 Butterworth Filter Bode Plot');
figure(2);
impulse(H);
title('Band-Pass 2 Butterworth Filter Impulse Response');
figure(3);
step(H);
title('Band-Pass 2 Butterworth Filter Step Response');
figure(4);
pzplot(H);
title('Band-Pass 2 Butterworth Filter Pole-Zero Plot');
```

```
H =

                                  2.555e41 s^9

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  9.842e13 s^15 + 1.41e19 s^14 + 1.949e24 s^13 + 1.58e29 s^12 +
 1.155e34 s^11

          + 6.022e38 s^10 + 2.793e43 s^9 + 9.58e47 s^8 + 2.923e52 s^7

               + 6.361e56 s^6 + 1.248e61 s^5 + 1.437e65 s^4 + 1.596e69
 s^3

Continuous-time transfer function.
```
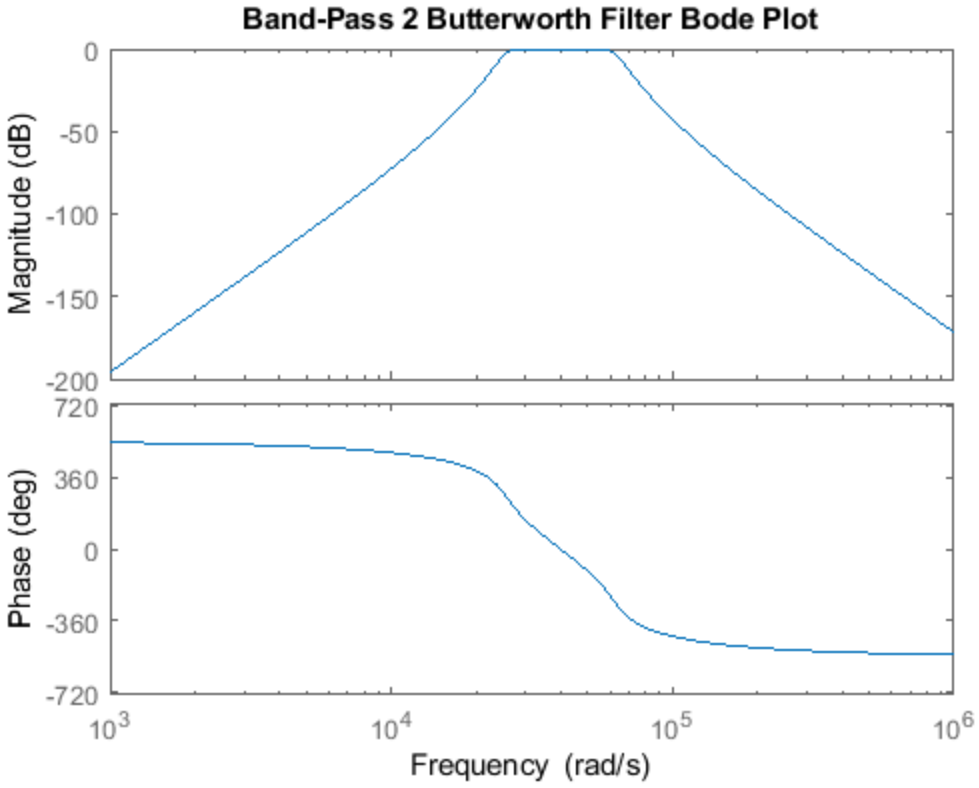
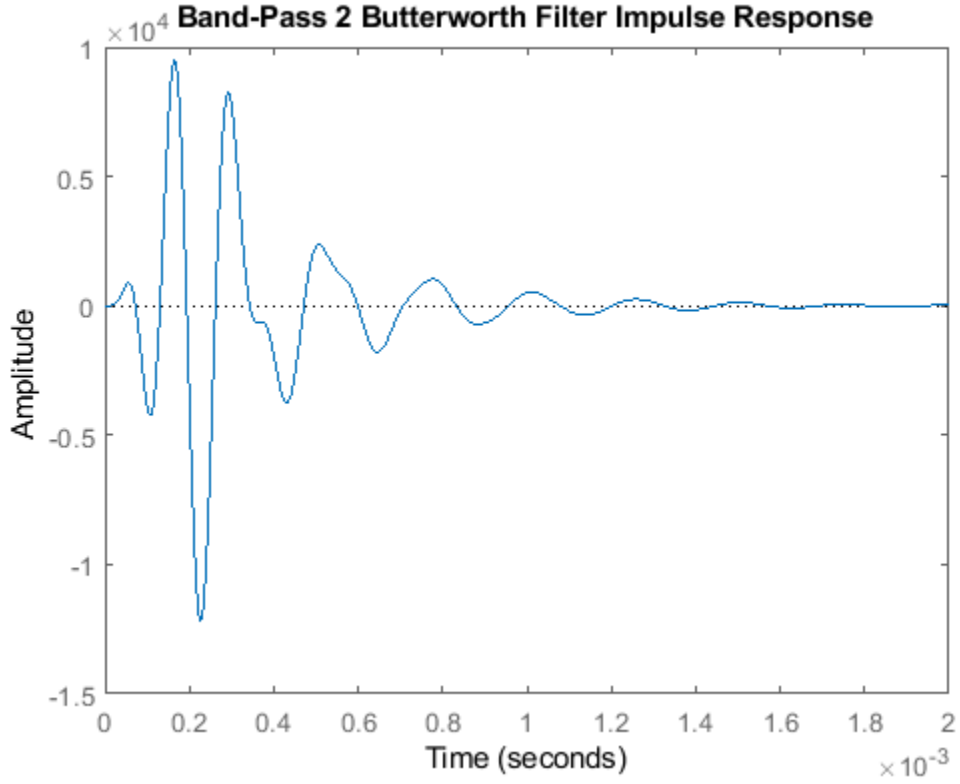
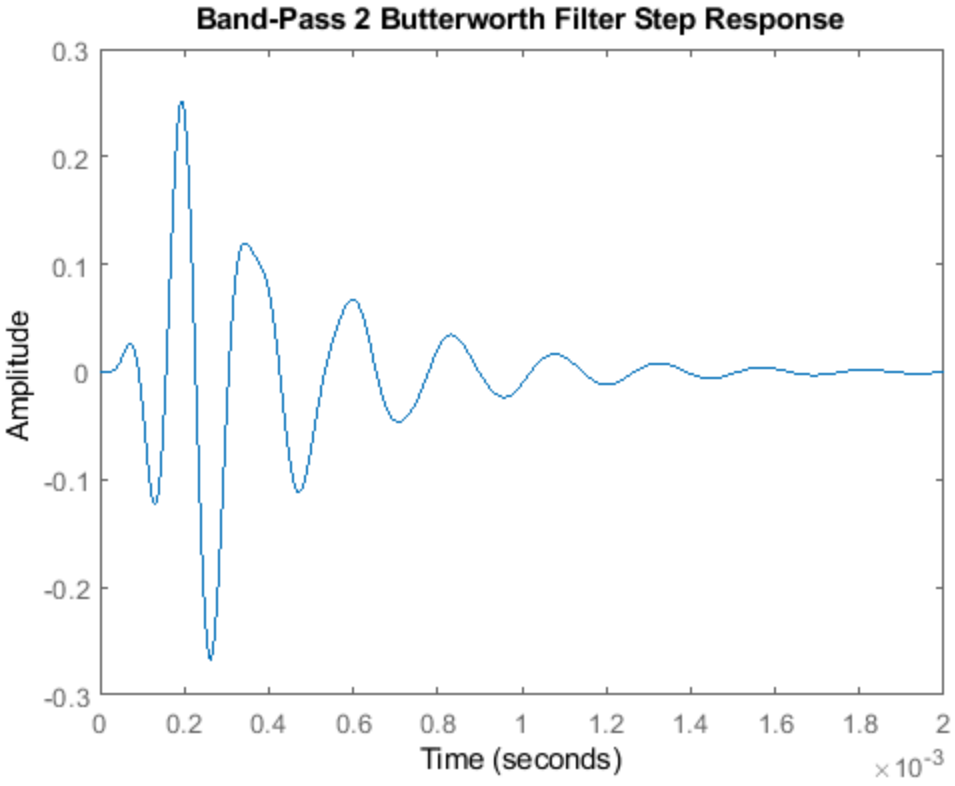
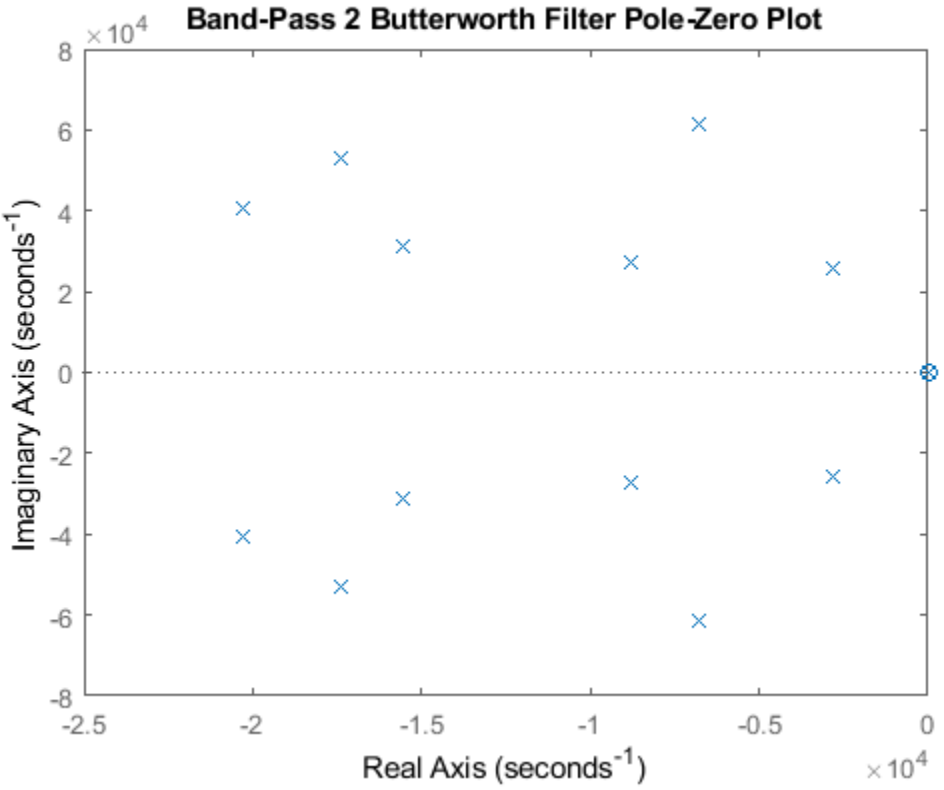


Band-Pass 2 Butterworth Filter Bode Plot
Magnitude (dB)
0
-50
-100
-150
-200
Phase (deg)
720
360
0
-360
-720
10^3
10^4
10^5
10^6
Frequency (rad/s)


Band-Pass 2 Butterworth Filter Impulse Response
$\times 10^4$
1
0.5
0
-0.5
-1
-1.5
Amplitude
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Time (seconds)
$\times 10^{-3}$


Band-Pass 2 Butterworth Filter Step Response
Amplitude
Time (seconds)
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
×10-3


Band-Pass 2 Butterworth Filter Pole-Zero Plot
×10^4
Imaginary Axis (seconds^-1)
Real Axis (seconds^-1)
8
6
4
2
0
-2
-4
-6
-8
-2.5
-2
-1.5
-1
-0.5
0
×10^4

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