

PROGRAM :

```

close()
clear()
%butterworth lpf hpf
ap=input('enter the passband attenuation');
as=input('enter the stopband attenuation');
fp=input('enter the passband frequency');
fs=input('enter the stopband frequency');
f=input('enter the sampling frequency');
ws=(2*fs)/f;
wp=(2*fp)/f;
[N,wc]=buttord(wp,ws,ap,as);
disp('order');
disp(N);
disp('normalised cut off frequency');
disp(wc);
[b,a]=butter(N,wc);
disp(b);
disp(a);
figure(1);
freqz(b,a,[],f);
title('low pass butterworth filter');
[b,a]=butter(N,wc,'high');
disp(b);
disp(a);
figure(2);
freqz(b,a,[],f);
title('high pass butterworth filter');

%butterworth bpf bsf
ap=input('enter the passband attenuation');
as=input('enter the stopband attenuation');
fp=input('enter the passband frequency');
fs=input('enter the stopband frequency');
f=input('enter the sampling frequency');
ws=(2*fs)/f;
wp=(2*fp)/f;
[N,wc]=buttord(wp,ws,ap,as);
disp('order');
disp(N);
disp('normalised cut off frequency');
disp(wc);
[b,a]=butter(N,wc);
disp(b);
disp(a);
figure(3);

```

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freqz(b,a,[],f);
title('band pass butterworth filter');
disp(b);
disp(a);
[b,a]=butter(N,wc,'stop');
figure(4);
freqz(b,a,[],f);
title('band stop butterworth filter');

```

```

%chebyshev1 lpf hpf
ap=input('enter the passband attenuation');
as=input('enter the stopband attenuation');
fp=input('enter the passband frequency');
fs=input('enter the stopband frequency');
f=input('enter the sampling frequency');
ws=(2*fs)/f;
wp=(2*fp)/f;
[N,wc]=cheb1ord(wp,ws,ap,as);
disp('order');
disp(N);
disp('normalised cut off frequency');
disp(wc);
[b,a]=cheby1(N,ap,wc);
disp(b);
disp(a);
figure(5);
freqz(b,a,[],f);
title('low pass chebyshev1 filter');
[b,a]=cheby1(N,ap,wc,'high');
disp(b);
disp(a);
figure(6);
freqz(b,a,[],f);
title('high pass chebyshev1 filter');

```

```

%chebyshev1 bpf bsf
ap=input('enter the passband attenuation');
as=input('enter the stopband attenuation');
fp=input('enter the passband frequency');
fs=input('enter the stopband frequency');
f=input('enter the sampling frequency');
ws=(2*fs)/f;
wp=(2*fp)/f;
[N,wc]=cheb1ord(wp,ws,ap,as);
disp('order');
disp(N);
disp('normalised cut off frequency');

```

```

disp(wc);
[b,a]=cheby1(N,ap,wc);
disp(b);
disp(a);
figure(7);
freqz(b,a,[],f);
title('band pass chebyshev1 filter');
[b,a]=cheby1(N,ap,wc,'stop');
disp(b);
disp(a);
figure(8);
freqz(b,a,[],f);
title('band reject chebyshev1 filter');

```

```

%chebyshev2 lpf hpf
ap=input('enter the passband attenuation');
as=input('enter the stopband attenuation');
fp=input('enter the passband frequency');
fs=input('enter the stopband frequency');
f=input('enter the sampling frequency');
ws=(2*fs)/f;
wp=(2*fp)/f;
[N,wc]=cheb2ord(wp,ws,ap,as);
disp('order');
disp(N);
disp('normalised cut off frequency');
disp(wc);
[b,a]=cheby2(N,ap,wc);
disp(b);
disp(a);
figure(9);
freqz(b,a,[],f);
title('low pass chebyshev2 filter');
[b,a]=cheby2(N,ap,wc,'high');
disp(b);
disp(a);
figure(10);
freqz(b,a,[],f);
title('high pass chebyshev2 filter');

```

```

%chebyshev2 bpf bsf
ap=input('enter the passband attenuation');
as=input('enter the stopband attenuation');
fp=input('enter the passband frequency');
fs=input('enter the stopband frequency');
f=input('enter the sampling frequency');
ws=(2*fs)/f;

```

```
wp=(2*fp)/f;  
[N,wc]=cheb2ord(wp,ws,ap,as);  
disp('order');  
disp(N);  
disp('normalized cut off frequency');  
disp(wc);  
[b,a]=cheby2(N,ap,wc);  
disp(b);  
disp(a);  
figure(11);  
freqz(b,a,[],f);  
title('band pass chebyshev2 filter');  
[b,a]=cheby2(N,ap,wc,'stop');  
disp(b);  
disp(a);  
figure(12);  
freqz(b,a,[],f);  
title('band reject chebyshev2 filter');
```

OUTPUT :

```
>> DSPEXP8
```

```
enter the passband attenuation
```

```
1
```

```
enter the stopband attenuation
```

```
20
```

```
enter the passband frequency
```

```
500
```

```
enter the stopband frequency
```

```
1000
```

```
enter the sampling frequency
```

```
5000
```

```
order
```

```
4
```

```
normalised cut off frequency
```

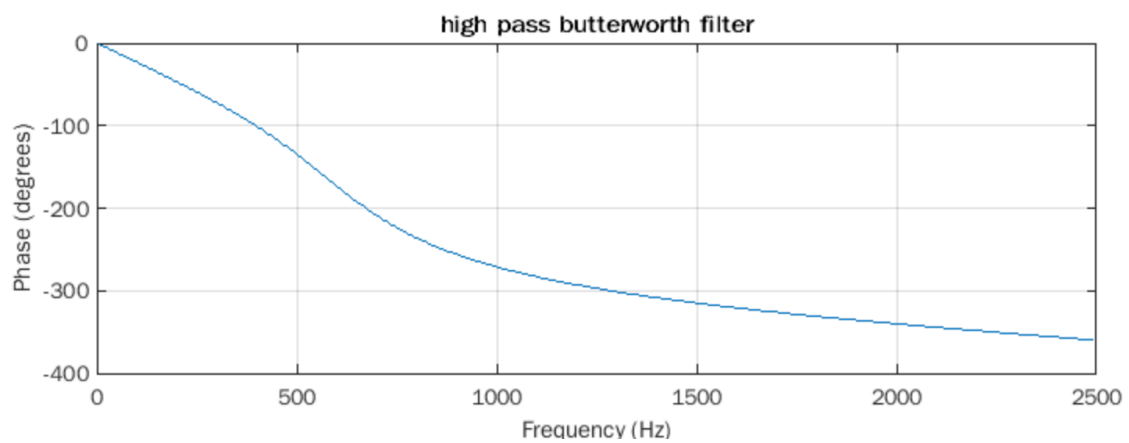
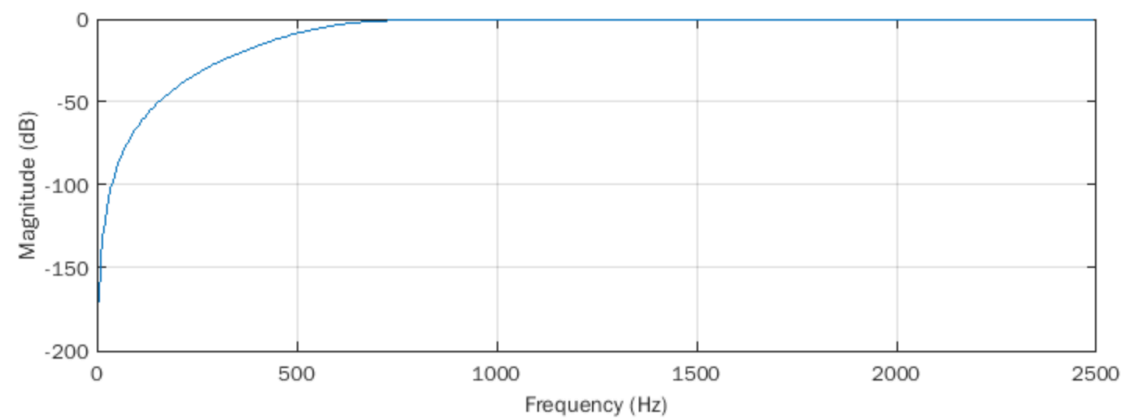
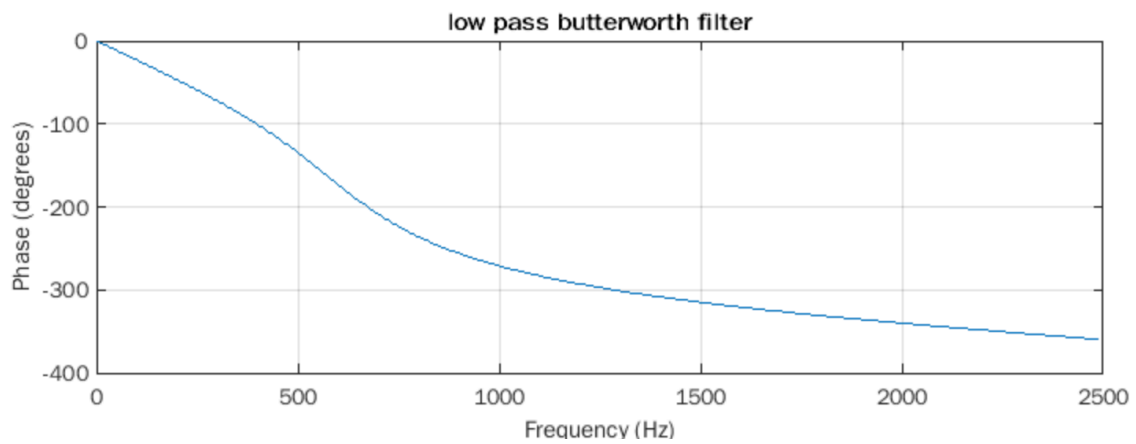
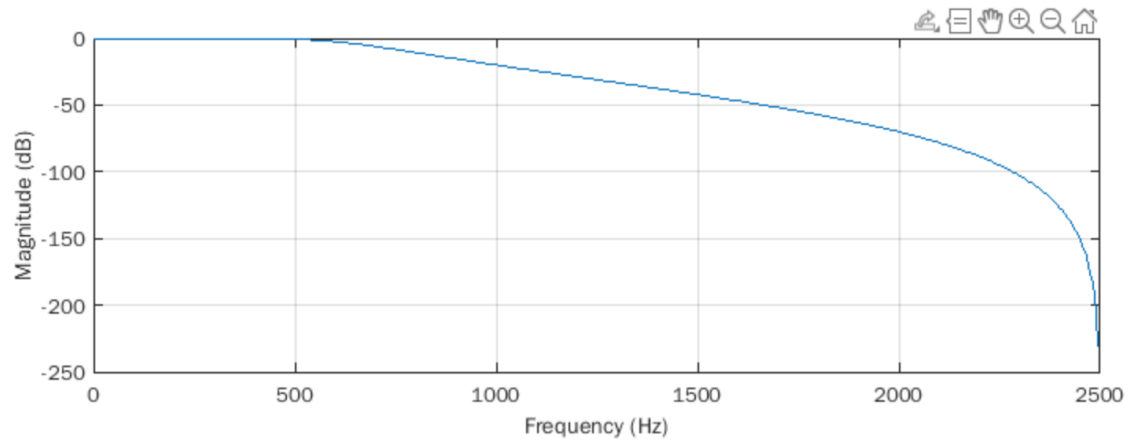
```
0.2472
```

```
0.0098    0.0393    0.0590    0.0393    0.0098
```

```
1.0000   -1.9908    1.7650   -0.7403    0.1235
```

```
0.3512   -1.4049    2.1073   -1.4049    0.3512
```

```
1.0000   -1.9908    1.7650   -0.7403    0.1235
```



enter the passband attenuation

1

enter the stopband attenuation

20

enter the passband frequency

[100, 1900]

enter the stopband frequency

[500, 1000]

enter the sampling frequency

5000

order

2

normalised cut off frequency

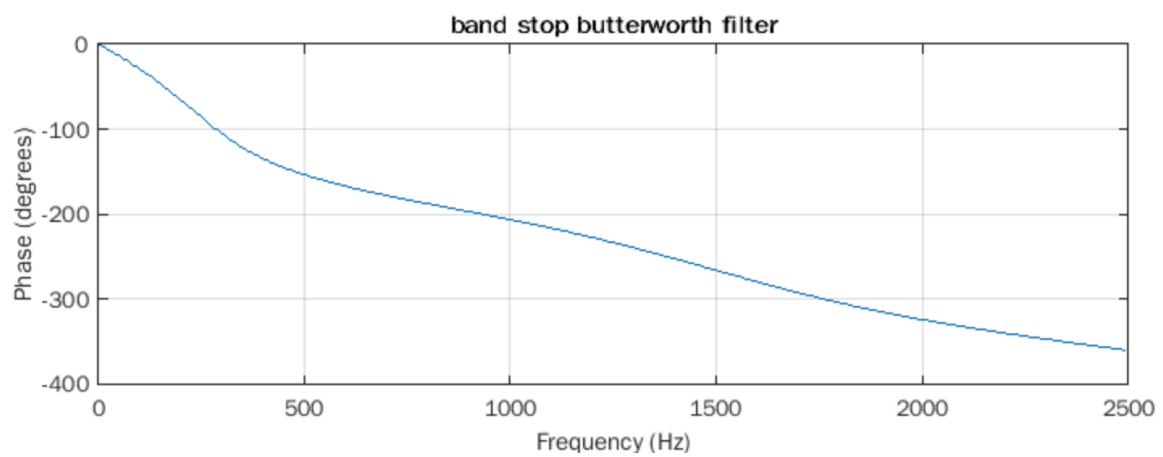
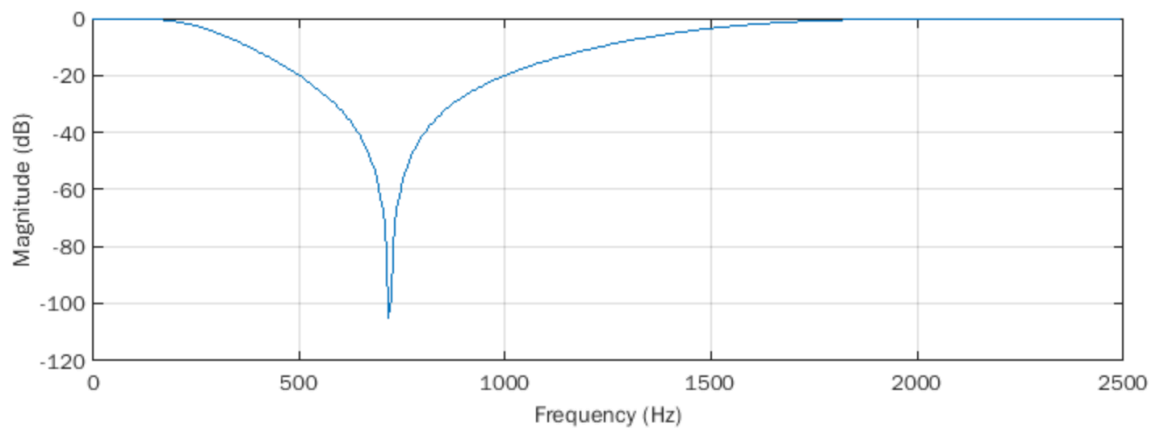
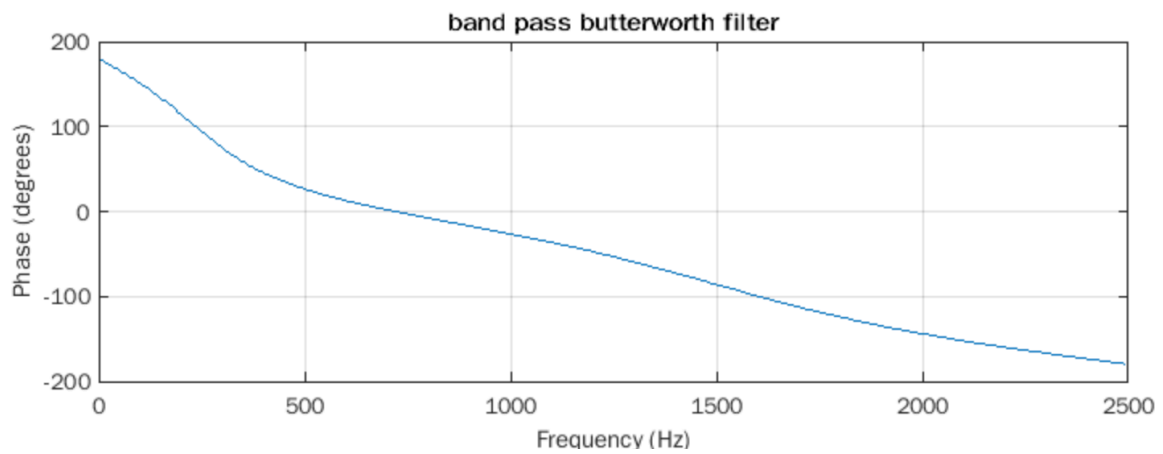
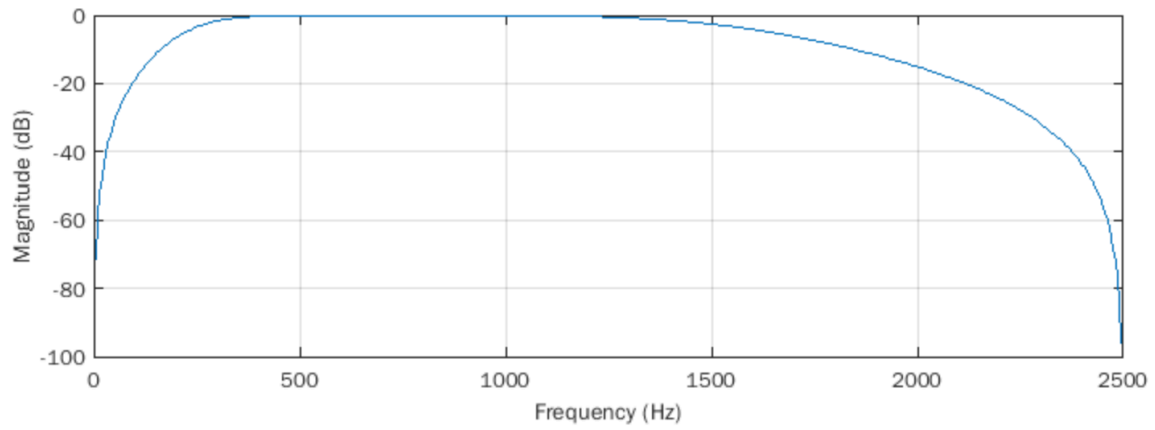
0.1040 0.6119

0.3002 0 -0.6005 0 0.3002

1.0000 -1.2182 0.4073 -0.1942 0.1717

0.3002 0 -0.6005 0 0.3002

1.0000 -1.2182 0.4073 -0.1942 0.1717



enter the passband attenuation

1

enter the stopband attenuation

20

enter the passband frequency

500

enter the stopband frequency

1000

enter the sampling frequency

5000

order

3

normalised cut off frequency

0.2000

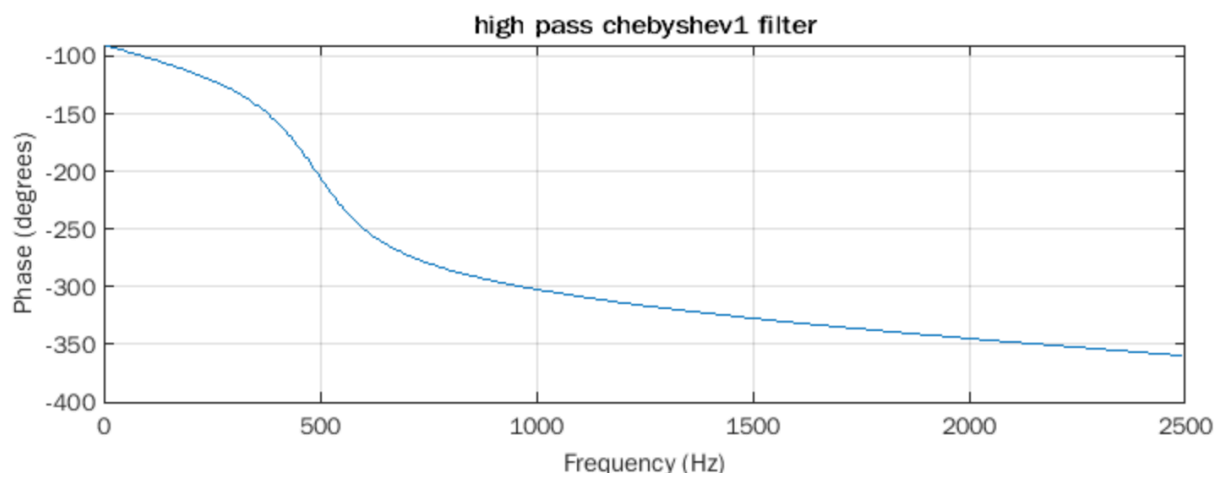
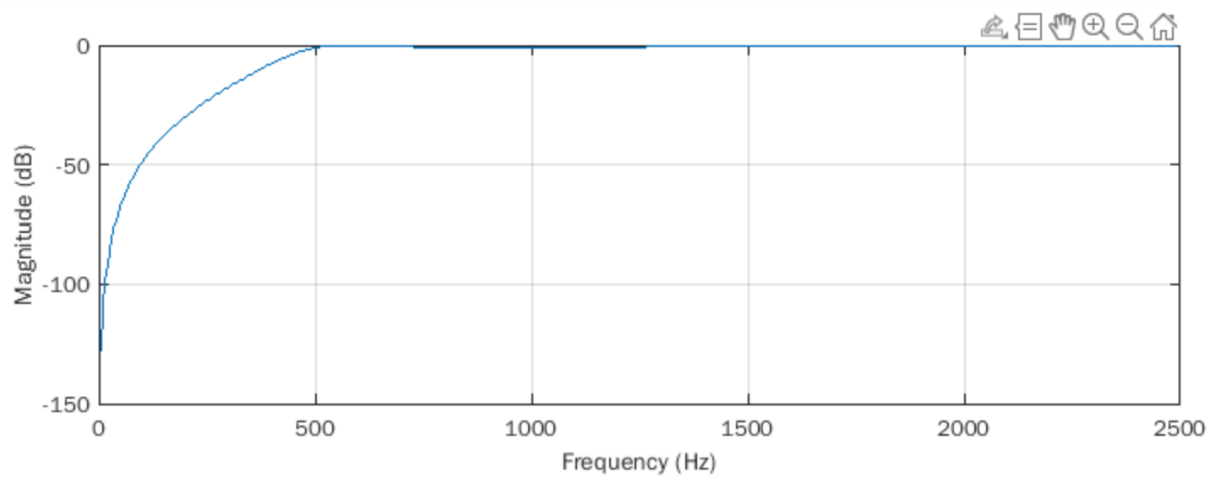
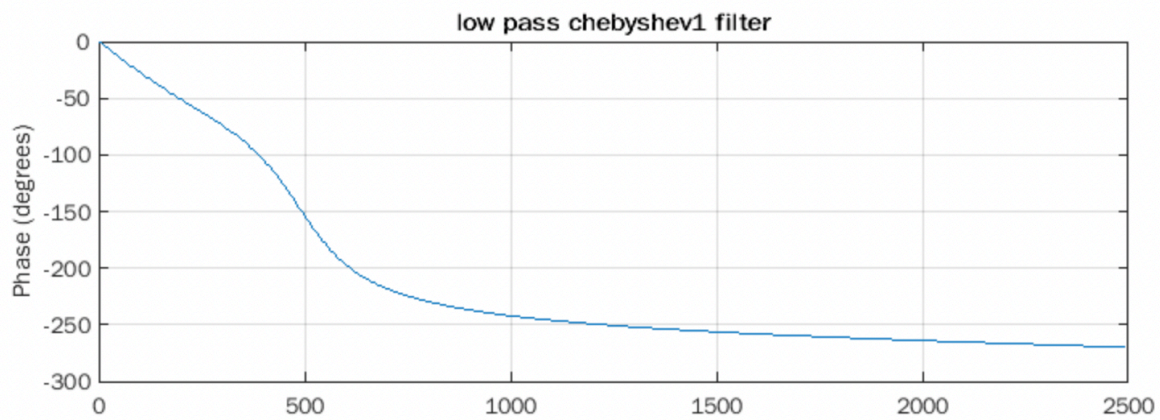
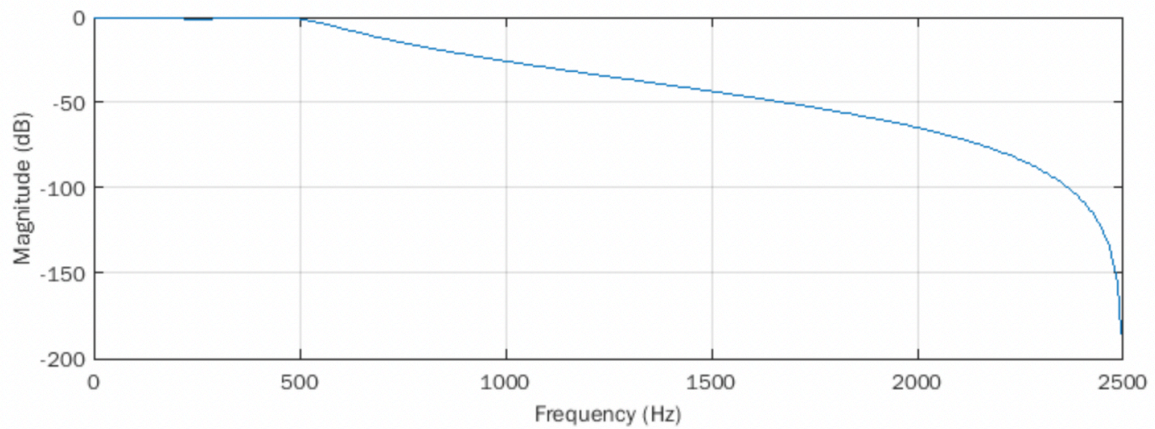
0.0115 0.0344 0.0344 0.0115

1.0000 -2.1378 1.7693 -0.5398

0.4759 -1.4278 1.4278 -0.4759

1.0000 -1.6168 1.0366 -0.1540

.



enter the passband attenuation

1

enter the stopband attenuation

20

enter the passband frequency

[100, 1900]

enter the stopband frequency

[500, 1000]

enter the sampling frequency

5000

order

2

normalised cut off frequency

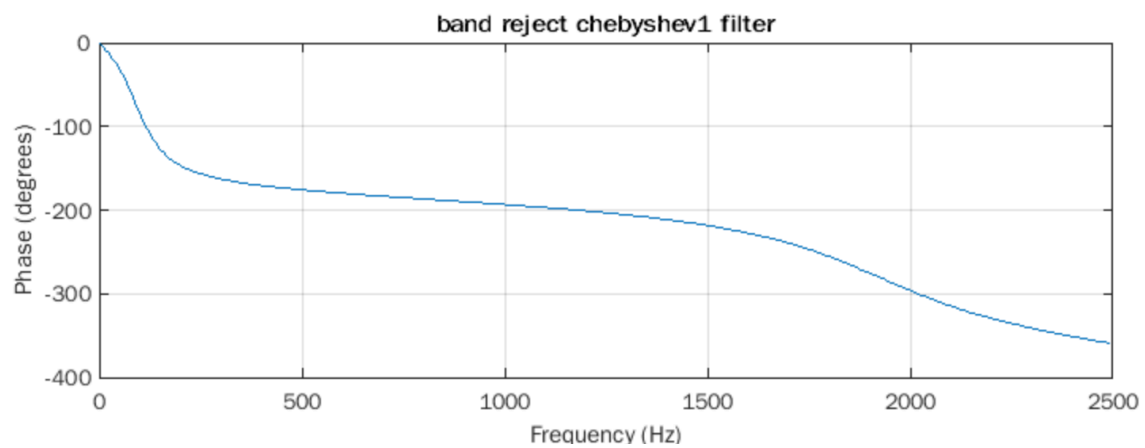
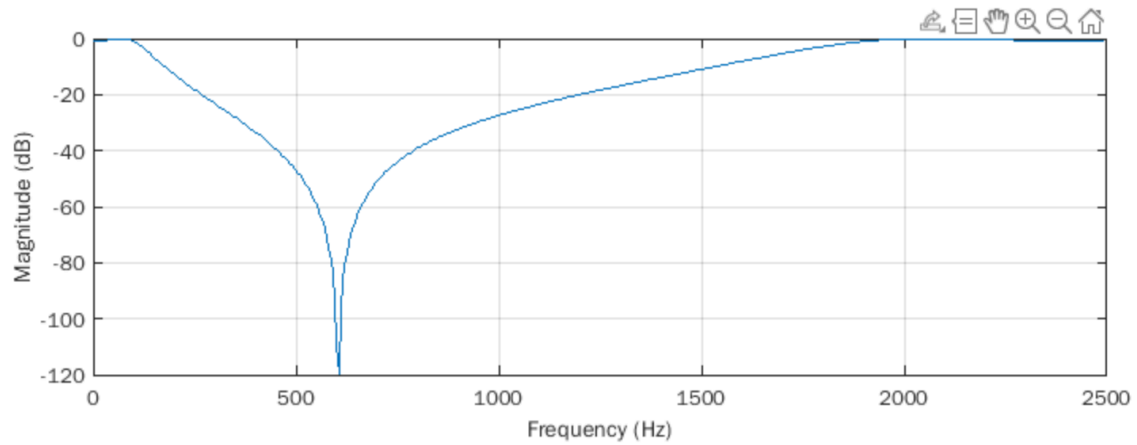
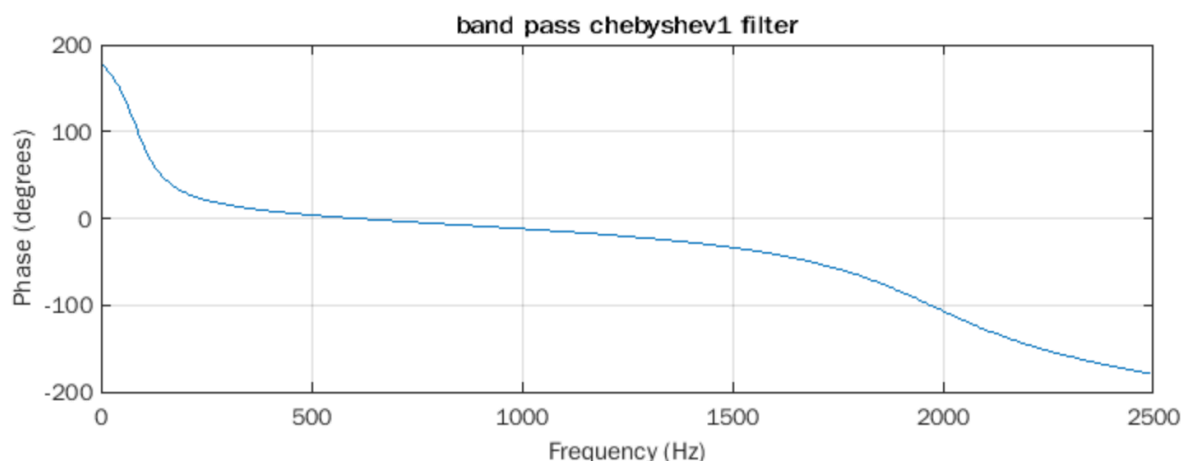
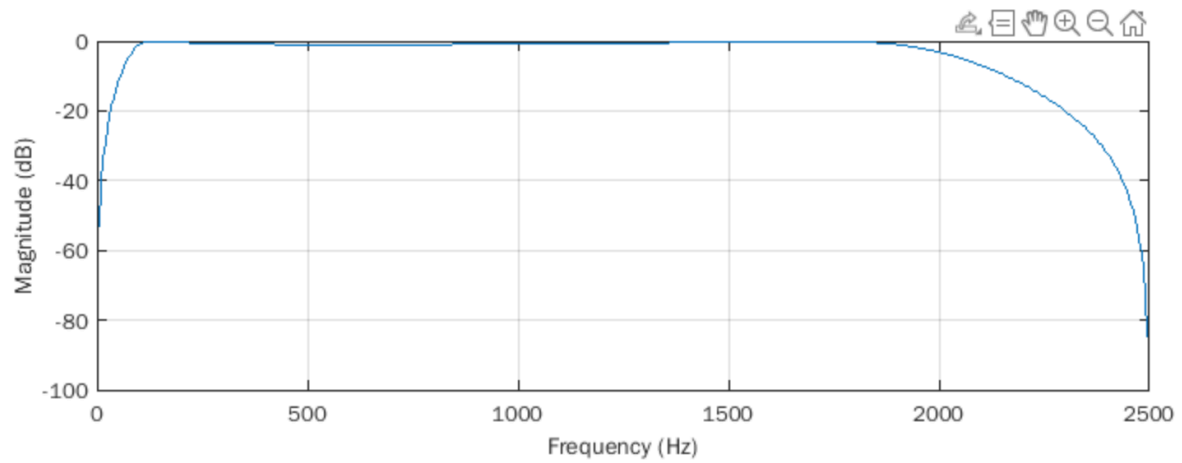
0.0400 0.7600

0.5339 0 -1.0678 0 0.5339

1.0000 -0.7567 -0.7039 0.0581 0.4387

0.1236 -0.3588 0.5075 -0.3588 0.1236

1.0000 -0.8284 -0.5665 0.0233 0.4132



enter the passband attenuation

1

enter the stopband attenuation

20

enter the passband frequency

500

enter the stopband frequency

1000

enter the sampling frequency

5000

order

3

normalised cut off frequency

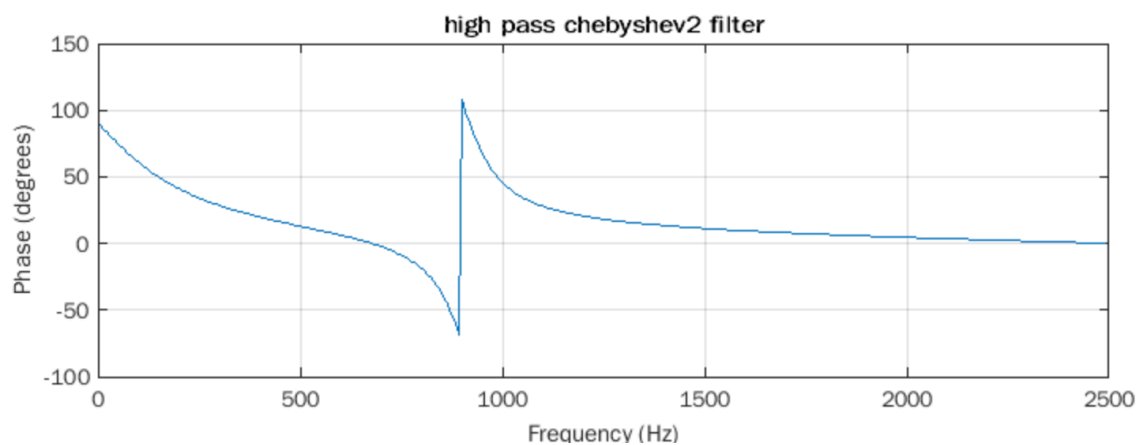
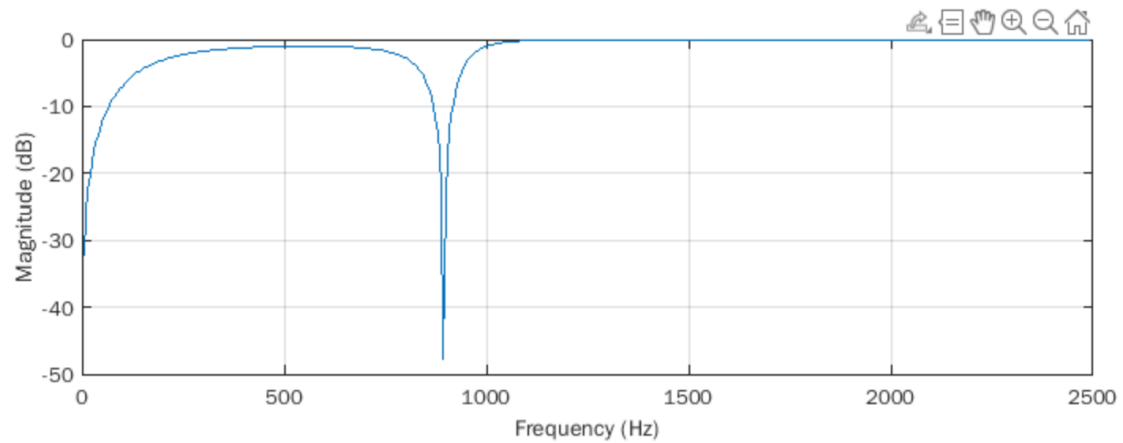
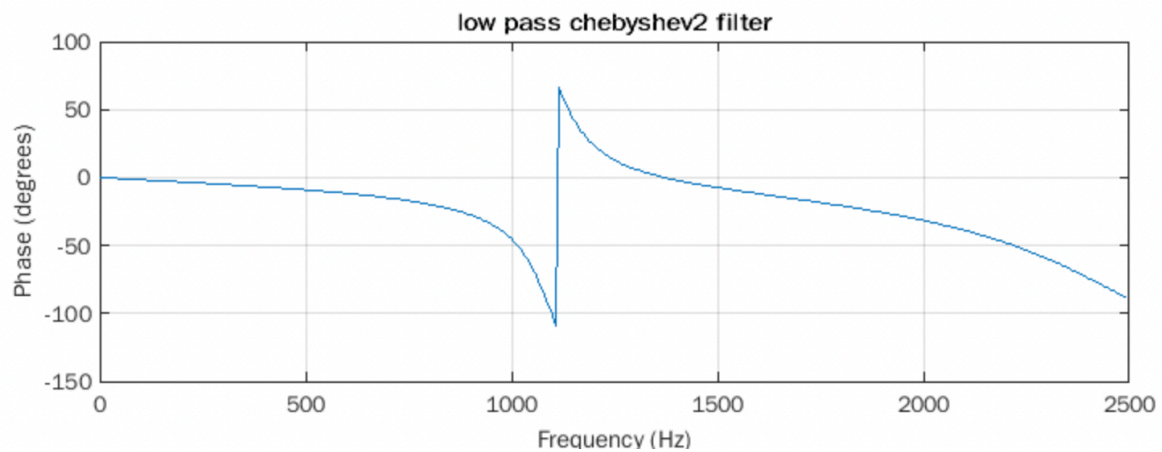
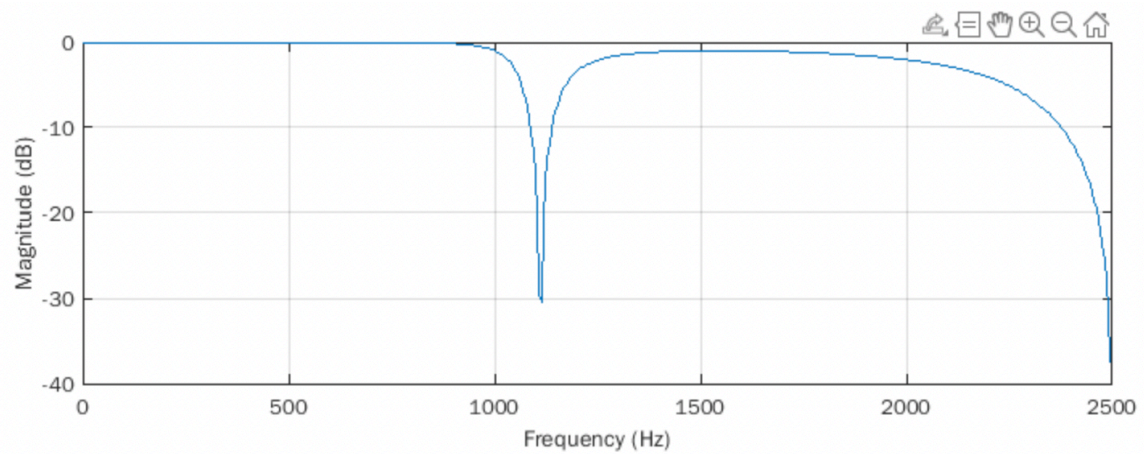
0.4000

0.7325 0.4778 0.4778 0.7325

1.0000 0.2824 0.6118 0.5265

0.8159 -1.5220 1.5220 -0.8159

1.0000 -1.5590 1.4519 -0.6648



enter the passband attenuation

1

enter the stopband attenuation

20

enter the passband frequency

[100, 1900]

enter the stopband frequency

[500, 1000]

enter the sampling frequency

5000

order

2

normalised cut off frequency

0.2000 0.4000

0.7763 -1.5845 1.9905 -1.5845 0.7763

1.0000 -1.9577 2.2665 -1.5980 0.7090

0.8977 -2.1080 2.9182 -2.1080 0.8977

1.0000 -2.2277 2.9073 -1.9884 0.8064

