Contents

```
clc; clear all;
```

Least Square Filter

```
f = [0 0.2075 0.25 0.5 0.543 1]; % Set the bandpass frequencies
a=[0 0 1 1 0 0];                 % Amplitude values at each region
w=[0.05,0.1,0.05];               % Scaling values at each region
Mls=49;                          %49 [[0 0.2075 0.25 0.5 0.543 1]
b=firls(Mls,f,a,w);              % Coefficients of Least square filter
N = 1024;
z = [0:2*N]*pi/N;
[H,W]=freqz(b,1,z);              % Magnitude and phase response
figure();
box_plot();
plot(W,abs(H));                  % Log-scale Magnitude response Plot
title('Filter Magnitude Response log scale');
ylabel('|H(w)|');
xlabel('w[rad/samples]');
set(gca,'YScale','log')
axis([0 1*Lw 0.0001 Htop]);
figure();
box_plot();
plot(W,abs(H));                  %Magnitude response Plot
title('Filter Magnitude Response');
ylabel('|H(w)|');
xlabel('w[rad/samples]');
figure();
phasez(b);
title('Filter phase Response');
ylabel('Phase(radians)');
xlabel('w[rad/samples]');
```

Optimum Equiripple

```
M=55;
f1=[0 0.2 0.255 0.5 0.5475 1]; % frequencies
b1=firpm(M,f1,a,w);            % Coefficients of filter
[H1,W1]=freqz(b1,1,z);
figure();
box_plot();
plot(W1,abs(H1));              % Log-scale Magnitude response Plot
title('Filter Magnitude Response log scale');
ylabel('|H(w)|');
xlabel('w[rad/samples]');
set(gca,'YScale','log')
axis([0 1*Lw 0.0001 Htop]);
figure();
box_plot();
```

```
plot(W1,abs(H1));                % Magnitude response Plot
title('Filter Magnitude Response');
ylabel('|H(w)|');
xlabel('w[rad/samples]');
figure();
phasez(b1);
title('Filter phase Response');
ylabel('Phase(radians)');
xlabel('w[rad/samples]');
```

Butterworth

```
%%Butterworth
Mbutter=17;                        % Orded of the filter
[b2,a2] = butter(Mbutter,[0.24 0.51],'bandpass'); %Coefficients
%0.2425 0.51, 0.24 0.51 12
[Hb,Wb]=freqz(b2,a2,z);
figure ();
box_plot();
plot(Wb,abs(Hb));                % Log-scale Magnitude response Plot
title('Filter Magnitude Response log scale');
ylabel('|H(w)|');
xlabel('w[rad/samples]');
set(gca,'YScale','log')
axis([0 1*Lw 0.0001 Htop]);
figure ();
box_plot();
plot(Wb,abs(Hb));                % Magnitude response Plot
title('Filter Magnitude Response');
ylabel('|H(w)|');
xlabel('w[rad/samples]');
figure();
phasez(b2,a2);
title('Filter phase Response');
ylabel('Phase(radians)');
xlabel('w[rad/samples]');
```

Chebyshev

```
Mcheby=6;              %order of the filter
[b3,a3] = cheby2(Mcheby,26.1206,[0.21 0.54],'bandpass'); %Coefficients
[Hc,Wc]=freqz(b3,a3,z);
figure ();
box_plot();
plot(Wc,abs(Hc));                % Log-scale Magnitude response Plot
title('Filter Magnitude Response log scale');
ylabel('|H(w)|');
xlabel('w[rad/samples]');
set(gca,'YScale','log')
axis([0 1*Lw 0.0001 Htop]);
figure ();
box_plot();
plot(Wc,abs(Hc));                % Magnitude response Plot
title('Filter Magnitude Response');
ylabel('|H(w)|');
xlabel('w[rad/samples]');
figure();
phasez(b3,a3);
```

```
title('Filter phase Response');
ylabel('Phase(radians)');
xlabel('w[rad/samples]');
```

```
title('Filter phase Response');
ylabel('Phase(radians)');
xlabel('w[rad/samples]');
```