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% Implementation on a low pass filter

clc;
clear all;
close all;

alphaP = 4;      % attenutaion in pass band
alphaS = 30;     % attenuation in stop band
fP = 400;        % pass band frequency
fS = 800;        % stop band frequency
FS = 2000;       % sampling frequency

% now declaring wP and wS

wP = ((2*3.14*(fP/FS))/3.14); % need to balance the output for buttord
wS = ((2*3.14*(fS/FS))/3.14); % function, by dividing the entire thing by pi

[n,Wc] = buttord(wP,wS,alphaP,alphaS); % used to get the order of the
                                         % buterworth filter

disp('The order of the filter is');
disp(n);
disp('The cutoff frequency is');
disp(Wc);

[b,a] = butter(n,Wc);
[H,W] = freqz(b,a,256); % frequency response

Magnitude_resp = 20*log(abs(H)); % magnitude response
phase_resp = angle(H); % phase response

subplot(2,1,1);
plot(W,Magnitude_resp);
xlabel('Frequency');
ylabel('Magnitude');

subplot(2,1,2);
plot(W,phase_resp);
xlabel('Frequency');
ylabel('Phase');

```

The order of the filter is
3

The cutoff frequency is
0.4914

