Digital FIR Band-pass Filter Design

Yankee Bush Software LLC

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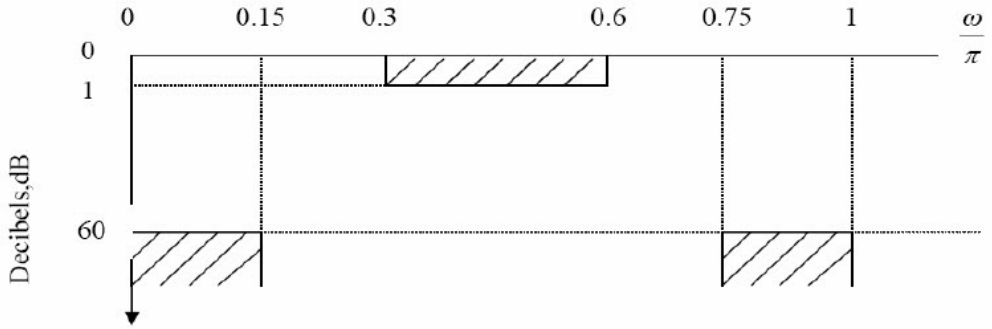
Decibels,dB

Problem Description

Design a digital FIR bandpass filter to meet the following specifications:

lower stopband edge: $\omega_{1s} = 0.15\pi$, $A_s = 60\ dB$
lower passband edge: $\omega_{1p} = 0.3\pi$, $R_p = 1\ dB$
upper passband edge: $\omega_{2p} = 0.6\pi$, $R_p = 1\ dB$
upper stopband edge: $\omega_{2s} = 0.75\pi$, $A_s = 60\ dB$



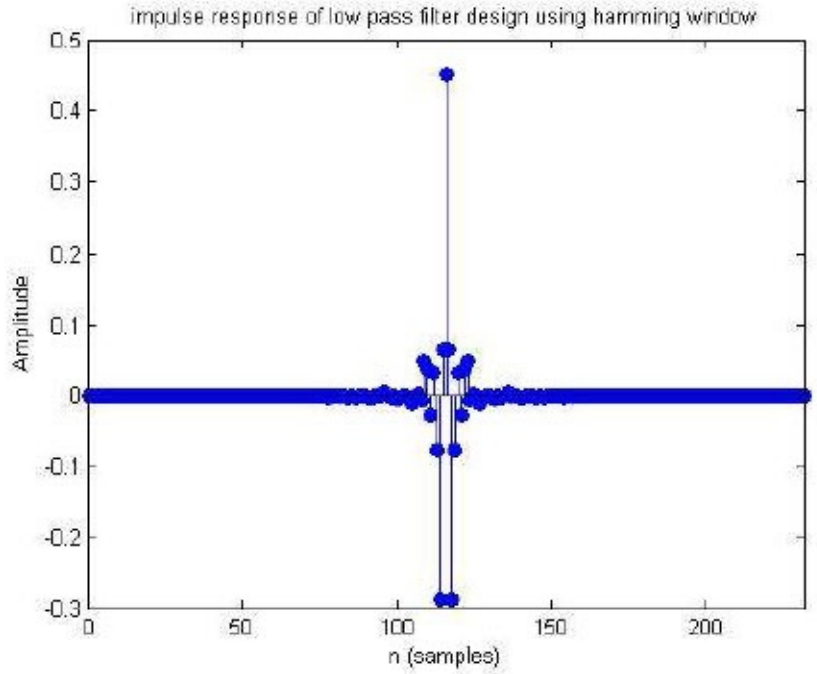
Determine the impulse response and plot the frequency response of the designed filter (magnitude response in dB).

Matlab Source Code

```
% design of Bandpass FIR filter
clc;
clear all;
ws1=0.15;%normalized frequency
wp1=0.3;
wp2=0.6;
ws2=0.75;
As=60; % in db
Rp=1; % in db
tr_width = min((wp1-ws1),(ws2-wp2))
M = ceil(11*pi/tr_width) + 1
wc1 = (ws1+wp1)/2;
wc2 = (wp2+ws2)/2;
f = [0 0.15 0.3 0.6 0.75 1]; m = [0 0 1 1 0 0];
b = fir2(M,f,m);
figure(1)
freqz(b,1);
title('frequency response of band-pass filter design using hamming
window');
figure(2)
```

```
impz(b,1);
title('impulse response of band-pass filter design using hamming
window');
```

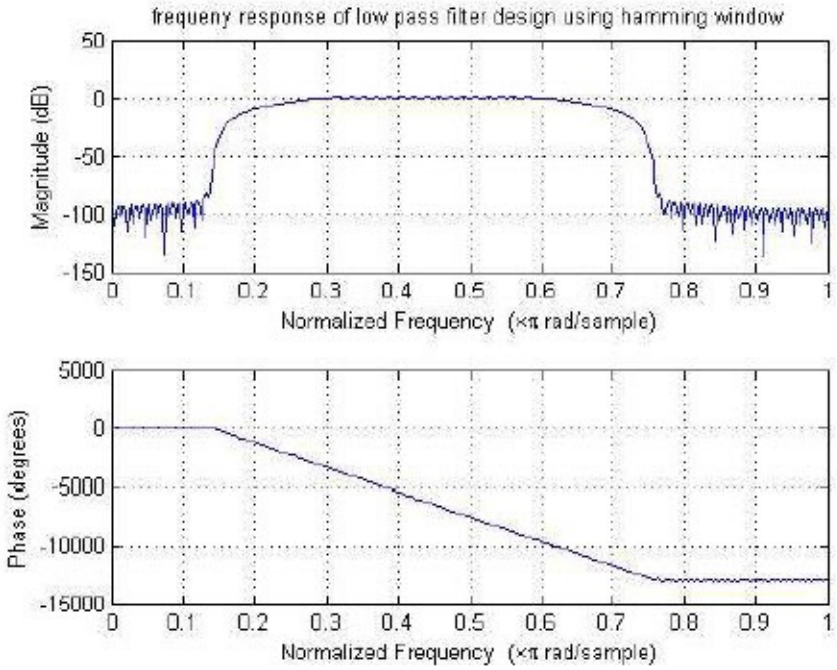
IMPULSE RESPONSE OF THE DESIGNED FILTER (MAGNITUDE RESPONSE IN DB)



F
D
R

Phase (degrees)

FREQUENCY RESPONSE OF THE DESIGNED FILTER (MAGNITUDE RESPONSE IN DB)



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