Chittagong University of Engineering & Technology

EEE-496

Digital Signal Processing Sessional

Class Performance on Filter Design.

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Contents

1 Designing Butterworth Low Pass Filter

1.1 Code

```
clc;
clear;
close all;
wp=0.4;
ws=0.9;
rp=5;
rs=100;
[n, wn]=buttord(wp, ws, rp, rs);
[x y]=butter(n, wn, "low");
[p q]=freqz(x, y, 60);
plot(abs(p), "linewidth", 1.5, "color", "r");
title("Frequency Response of Lowpass Filter", "fontsize", 15);
xlabel("Frequency", "fontweight", "bold");
ylabel("Magnitude", "fontweight", "bold");
```
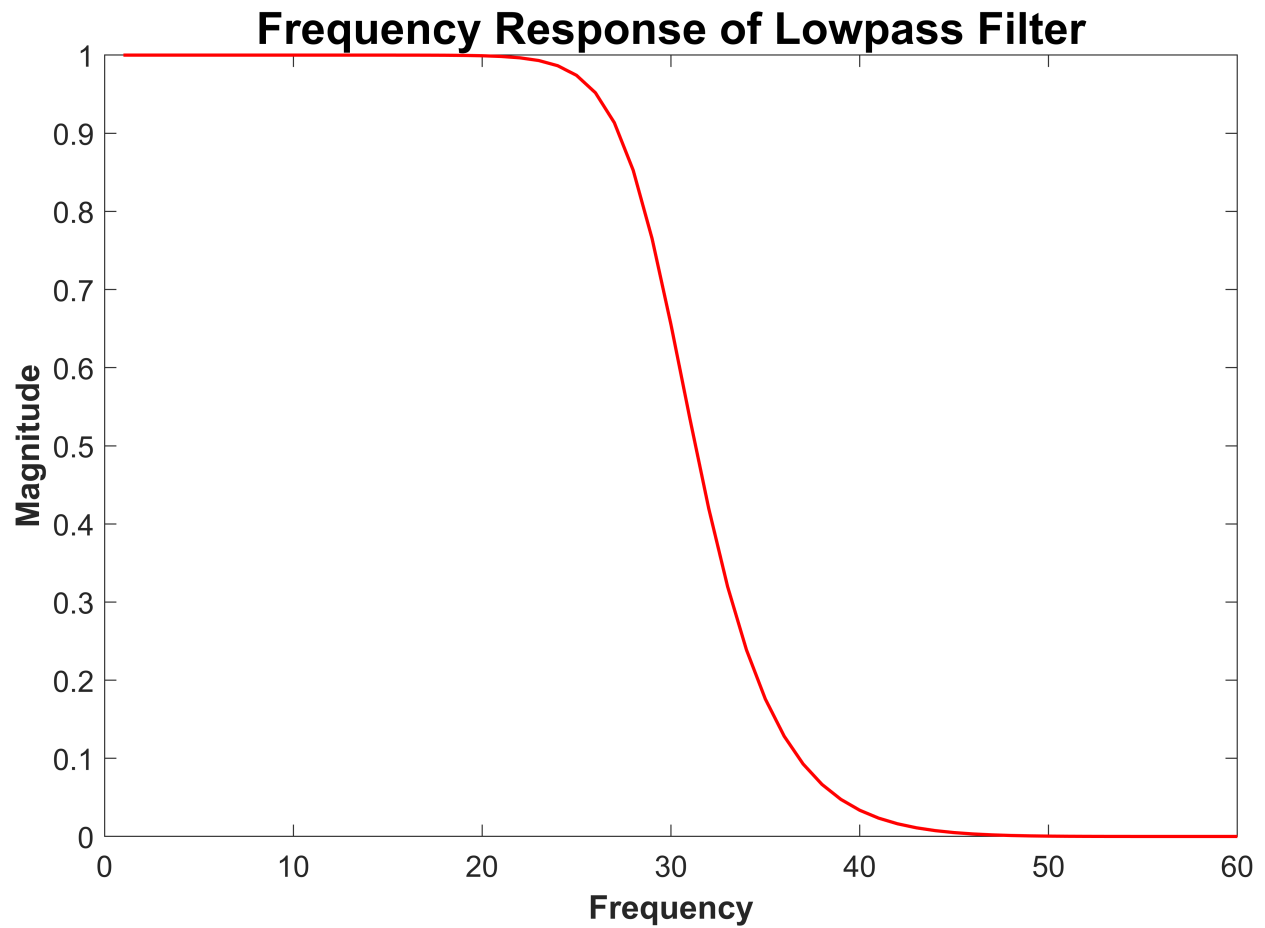
1.2 Figure

Figure 1: Frequency response of butterworth low pass filter.

2 Designing Butterworth High Pass Filter

2.1 Code

```
clc;
clear;
close all;
wp=0.7;
ws=0.5;
rp=5;
rs=100;
[n, wn]=buttord(wp, ws, rp, rs);
[x y]=butter(n, wn, "high");
[p q]=freqz(x, y, 150);
plot(abs(p), "linewidth", 1.5, "color", "r");
grid on;
```

```
title("Frequency Response of Highpass Filter", "fontsize", 15);
xlabel("Frequency", "fontweight", "bold");
ylabel("Magnitude", "fontweight", "bold");
```
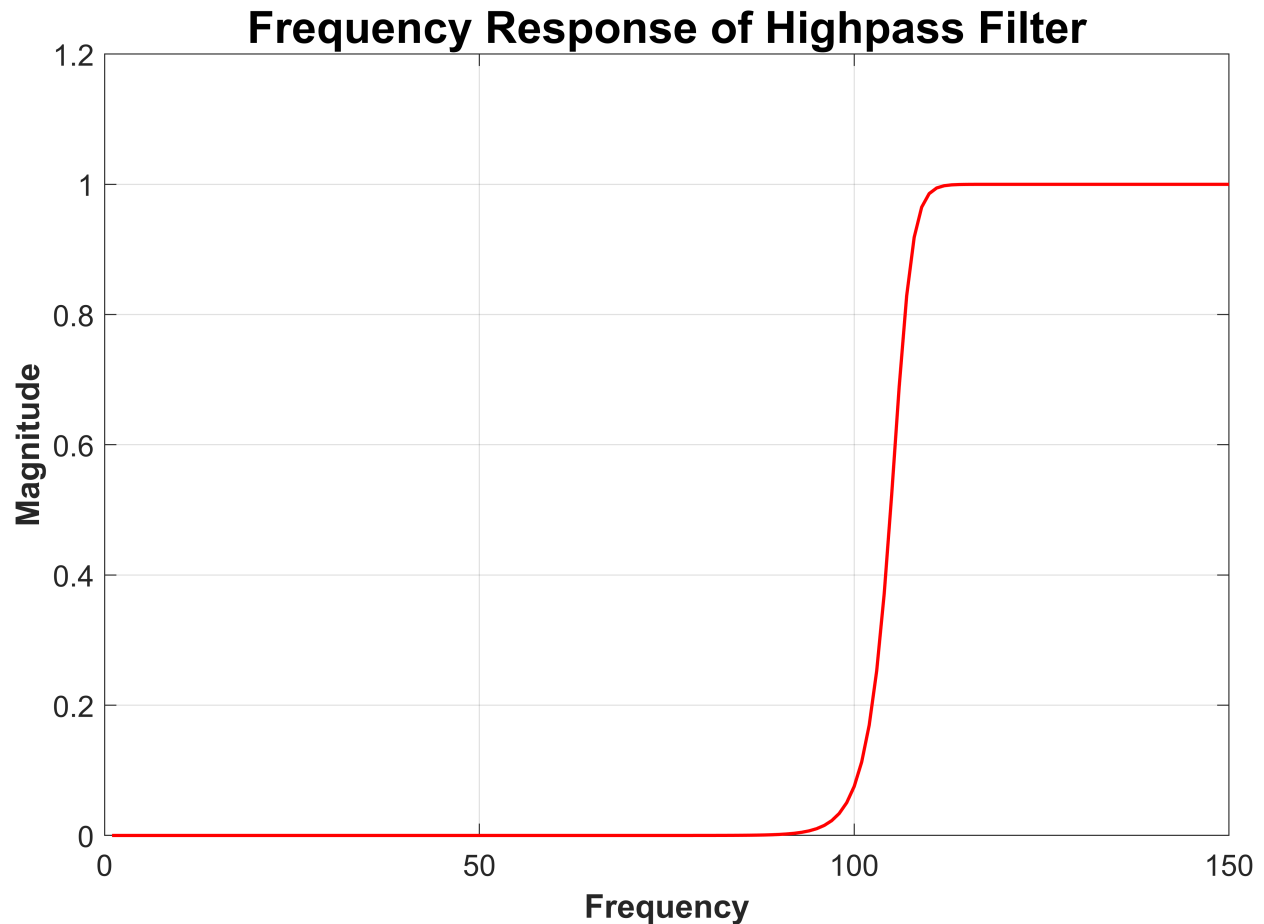
2.2 Figure

Figure 2: Frequency response of butterworth high pass filter.

3 Designing Butterworth Low Pass Filter with Sampling Frequency $3000Hz$

3.1 Code

```
clc
clear all
close all
fc=100;
fs=3000;
[X,Y]=butter(5,(2*fc/fs),'low');
[h,om]=freqz(X,Y,fs);
```

```
plot(abs(h),"linewidth", 1.5, "color", "r");
grid on;
title("Frequency Response of Lowpass Filter(Sampling)", "
   fontsize", 15);
xlabel("Frequency", "fontweight", "bold");
ylabel("Magnitude", "fontweight", "bold");
xlim([0 1000]);
```
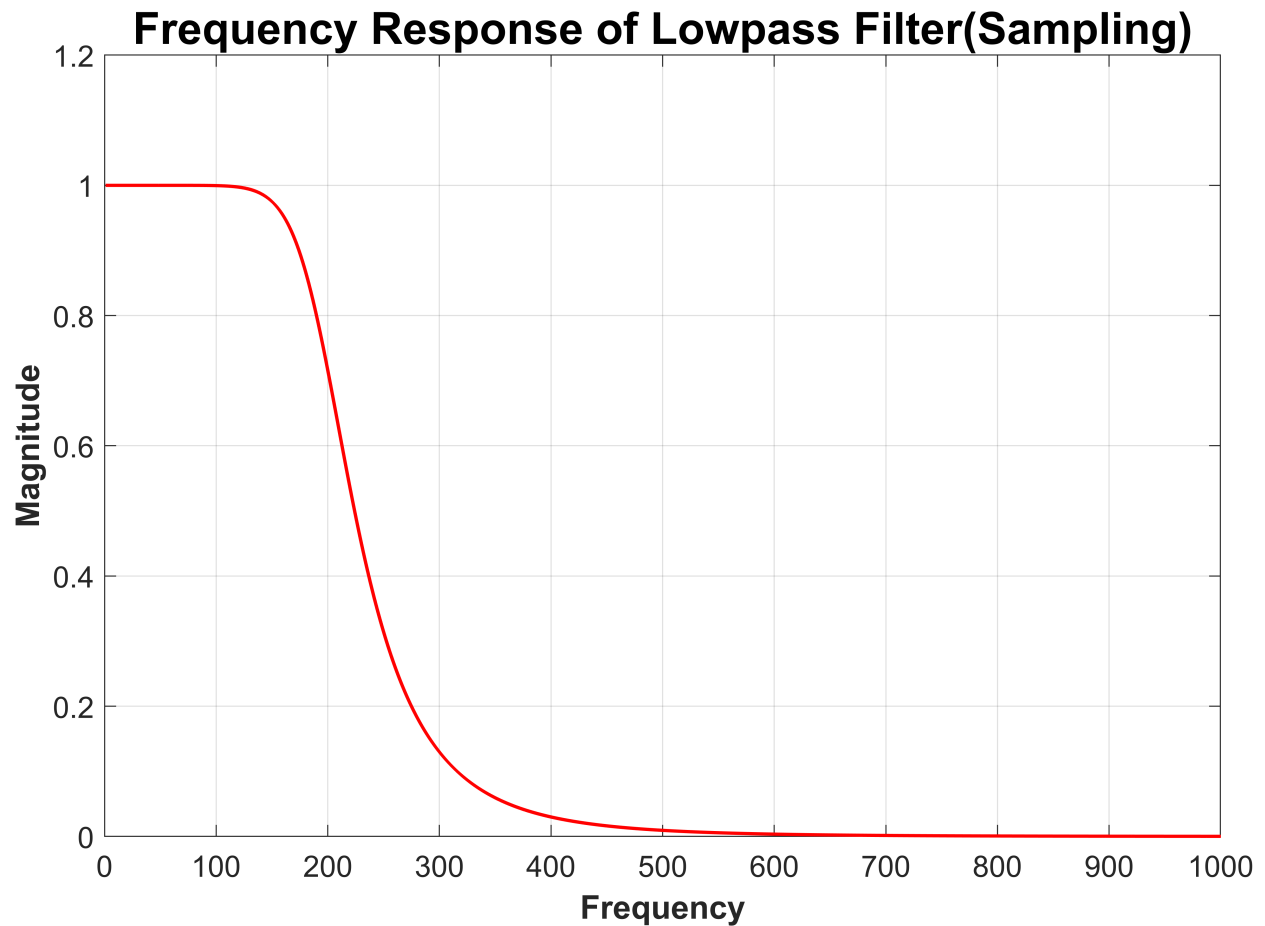
3.2 Figure

Figure 3: Frequency response of butterworth low pass filter with sampling rate 3000 Hz.