Lab 7 Assignment

YingTa Lin (ytl287)

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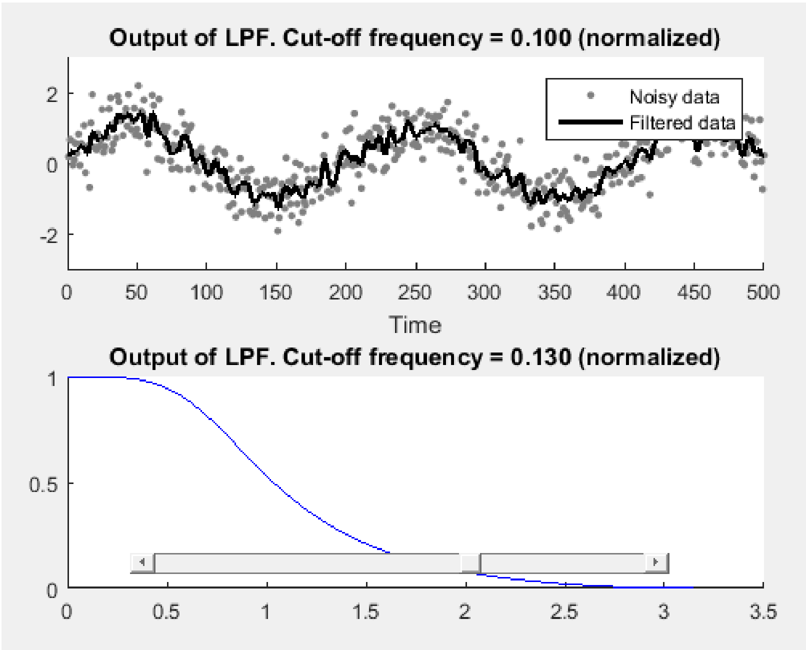
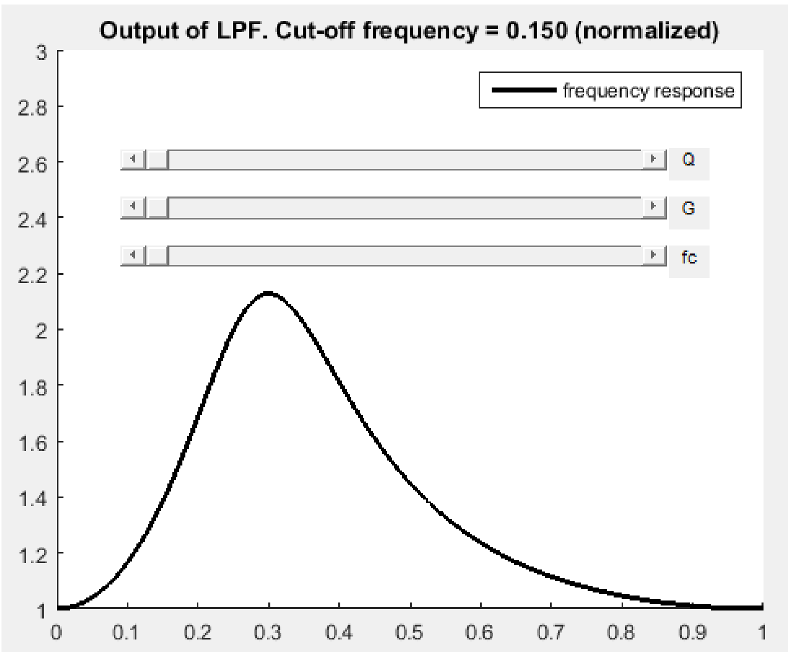
Assignment 1:

See “Lab7_1_ytl287.m”



Assignment 2:

See “Lab7_2_ytl287.m” (This code needs Matlab2015a to run)



Assignment 3:

Nothing need to be submit

Assignment 4:

An All-pass filter is defined by the reverse coefficient of the nominator and denominator of the H(z) function. By using coefficients `[1+alpha -2*cos(wc) 1-alpha]`, `wc can be defined. Instead of using noise data, I create a chirp wav sound to verify that the notch filter is working.`

Assignment 5:

See "Lab7_5_ytl287.pdf"

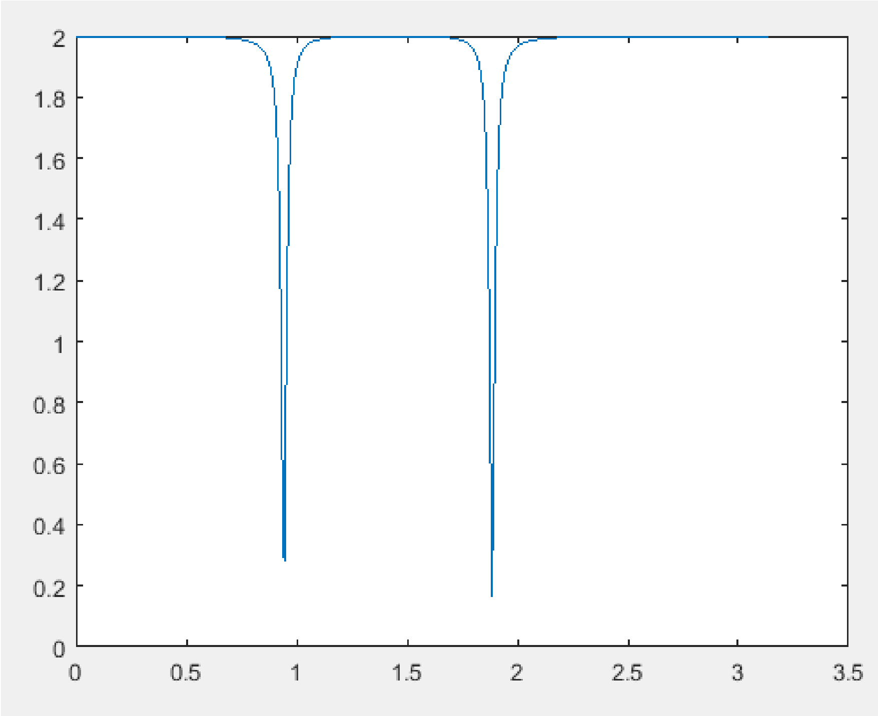
By cascade two 2-order all-pass notch filters, I get two notches. The frequency can be set by wc1 and wc2 used by the code fragment below.

```
%% Order-2 example
wc1 = 0.3*pi;
alpha1 = 0.02;
a1 = [1+alpha1 -2*cos(wc1) 1-alpha1];
b1 = flip(a1);

wc2 = 0.6*pi;
alpha2 = 0.02;
a2 = [1+alpha2 -2*cos(wc2) 1-alpha2];
b2 = flip(a2);

a = conv(a1,a2);
b = conv(b1,b2);
[H, om] = freqz(b, a);
plot(om, abs( Id + H ) );
% Now the total system is a notch filter with a null.
% Where is the null?
% It is at the frequency where the all-pass filter is -1.
% At om = pi, the frequency response of the total system
% is 2 because the all-pass system is 1 at that frequency
% so it adds to the direct path.
```

The frequency response of the LTI system looks like the figure below.



Assignment 6:

See “Lab7_6_ytl287.py”

Compare to flanger filter, it sounds the same because we didn’t assign oscillation to the weep depth, it is a fixed frequency phasor.