TP N°3
Filter Application

Lab Equipments :

1- PC with Matlab software installed.

2- Headphone.

Lab Work:

In this part, we will use the notch filter designed in the previous part to suppress a single tone from a corrupted speech signal.

1. Load the speech signal stored as a wave signal using the command:

[Y,FS,NBITS]=wavread('aspect11');

2. Listen to this speech signal using the command:

sound(Y,FS)

3. Generate a 3kHz single tone sinusoidal signal with the same length of the speech signal with the command:

n=(0:length(Y)-1);X=cos(2*n*pi*3000/FS);

4. Mix the speech signal with the single tone signal with the command:

Mix=0.05*X+Y';

5. Listen to the Mixed speech signal using the command:

sound(Mix,FS)

6. Evaluate and plot the amplitude spectrum of both the original speech signal and the mixed signal with the command:

HY= Single_Sided_Amplitude_Spectrum(Y,FS);

HMix= Single_Sided_Amplitude_Spectrum(Mix,FS);

Notice the presence of high spike at frequency 3kHz in the later spectrum.

7. To suppress the single tone from the corrupted speech signal use the notch filter designed in the previous part. First, verify the response of the filter using the command:

freqz(NumNotch,DenNotch)

A figure of both the amplitude and phase response of the filter will be created. Then, use the following command to apply the notch filter to the mixed signal:

YF=filter(NumNotch,DenNotch,Mix);

8. Verify the suppression of the single tone from the mixed signal by plotting and listening to the filtered signal YF using the Single_Sided_Amplitude_Spectrum and the sound functions.

Bibliography

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- Digital Signal Processing and Applications with the TMS320C6713 and TMS320C6416 DSK SECOND EDITION by Rulph Chassaing Worcester Polytechnic Institute and Donald Reay Heriot-Watt University