Cairo University

Computer Engineering Department

Faculty of Engineering

Third year

Communication Engineering Project

Team's members

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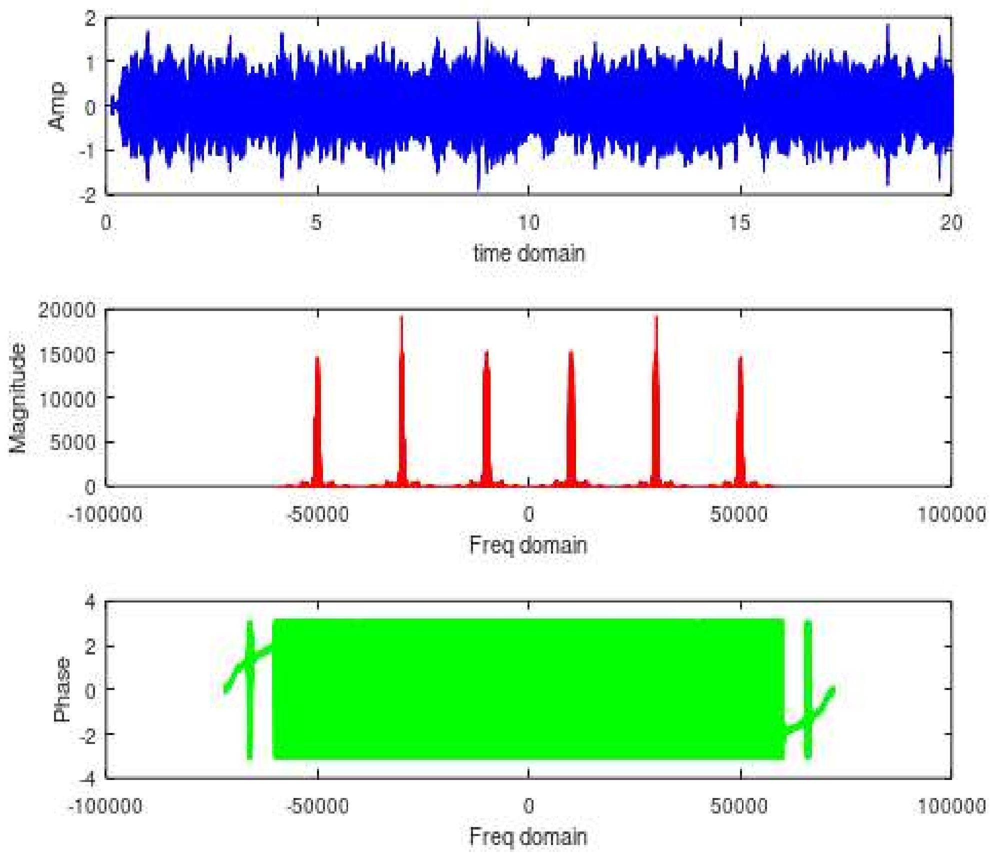


Modulated signal = signal1*cos(2*pi*fc1*t)+ signal2*cos(2*pi*fc2*t)+ signal3*cos(2*pi*fc3*t)

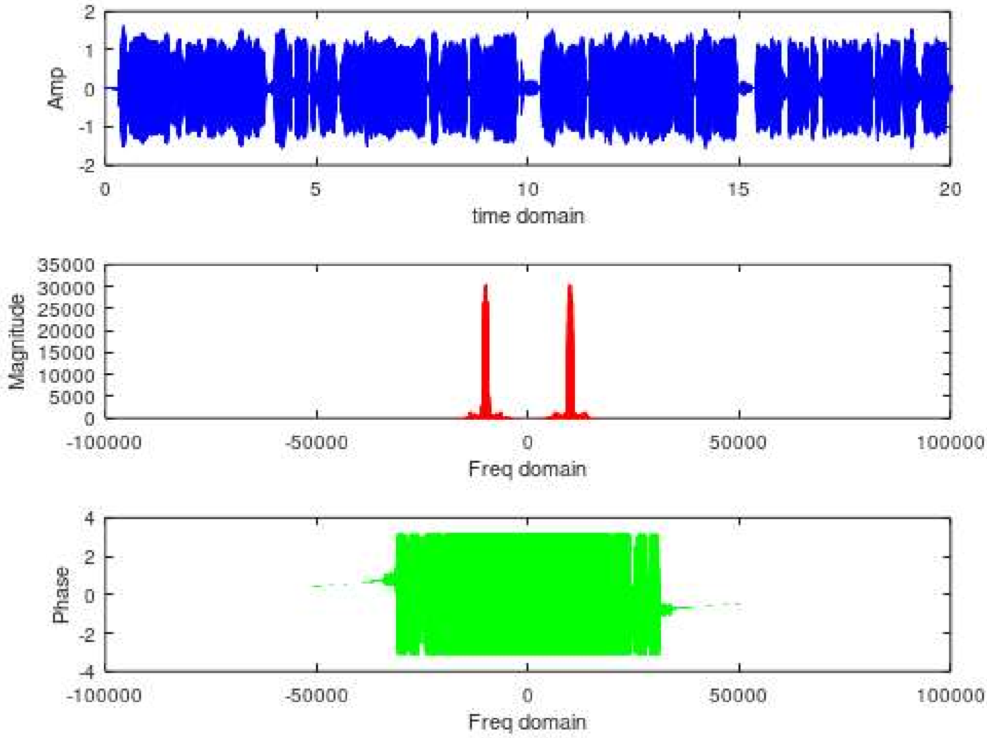
Where :

Fc1=10000 Hz , fc2=30000 hz , fc3=50000hz
BW=10000

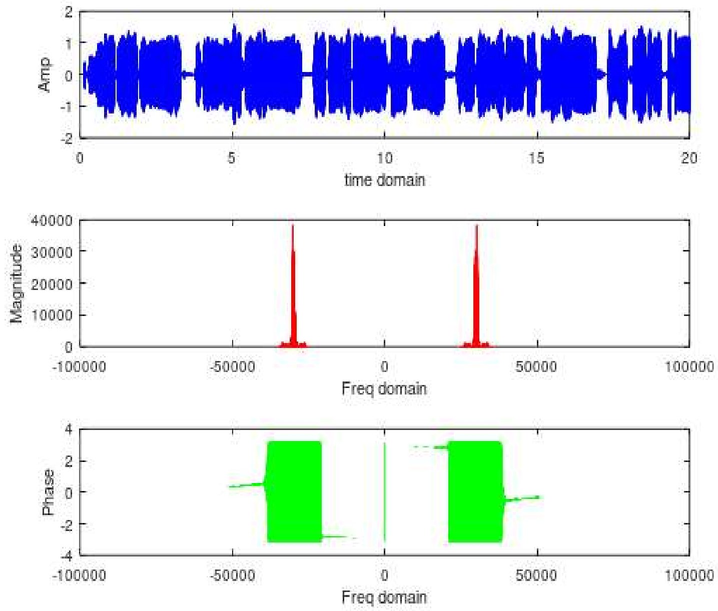
Demodulation

1- Applying BPF to the modulated signal :

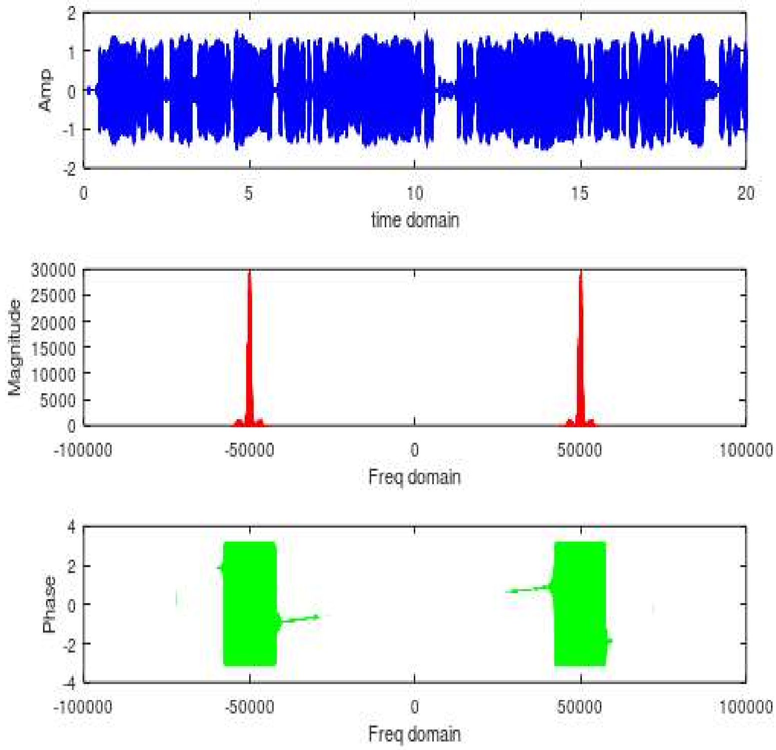
Signal(1) after passing the modulated signal to BPF



Signal(2) after passing the modulated signal to BPF

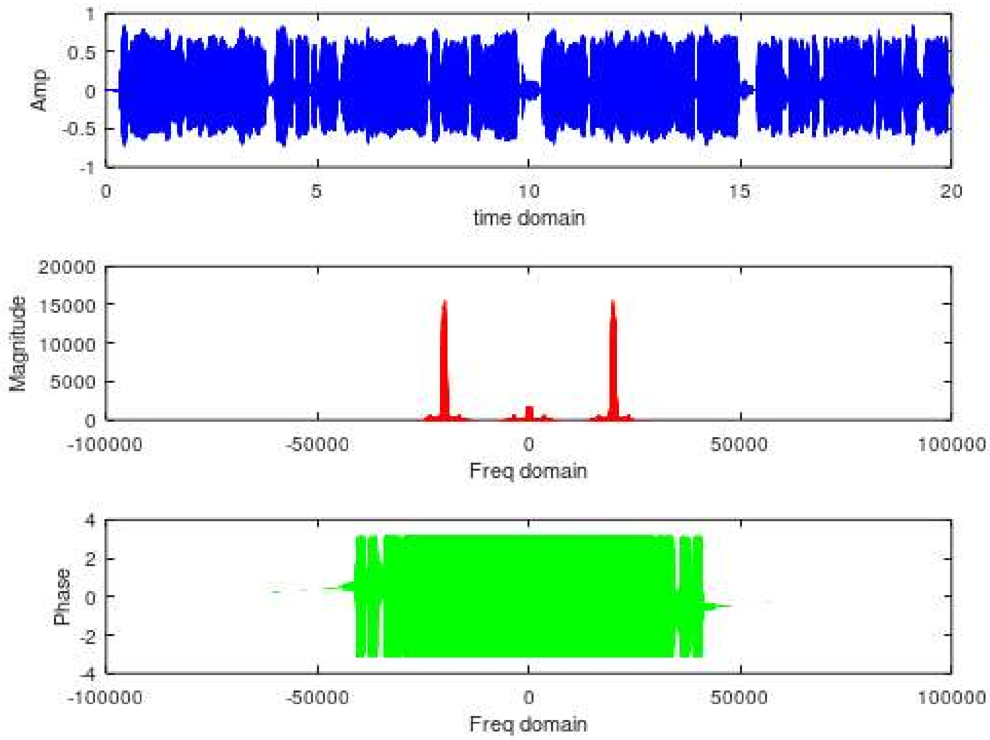


Signal(3) after passing the modulated signal to BPF

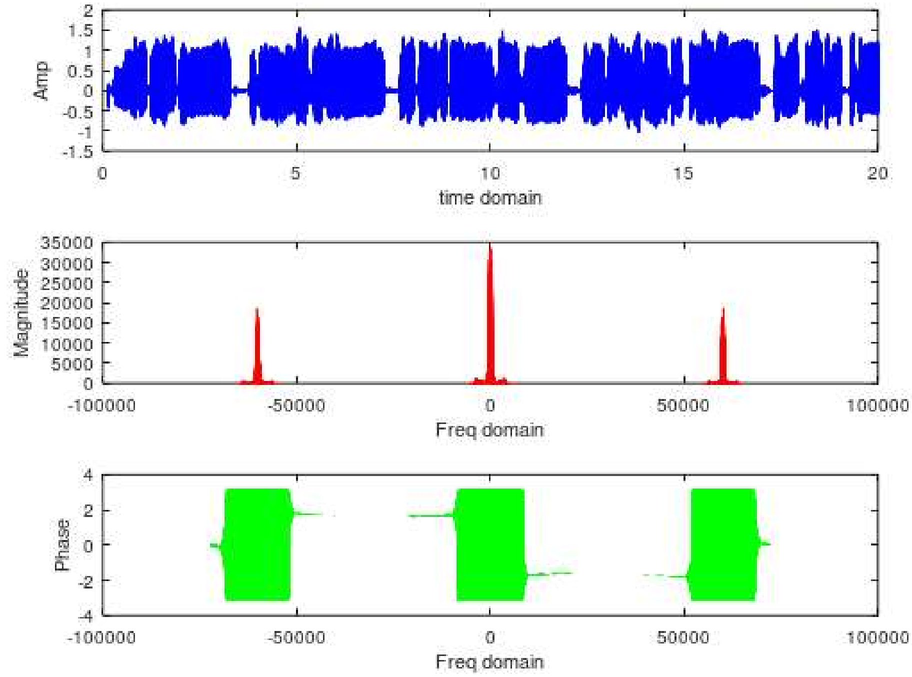


2-Multiplying by Cos(2*pi*fc*t) to return to Baseband

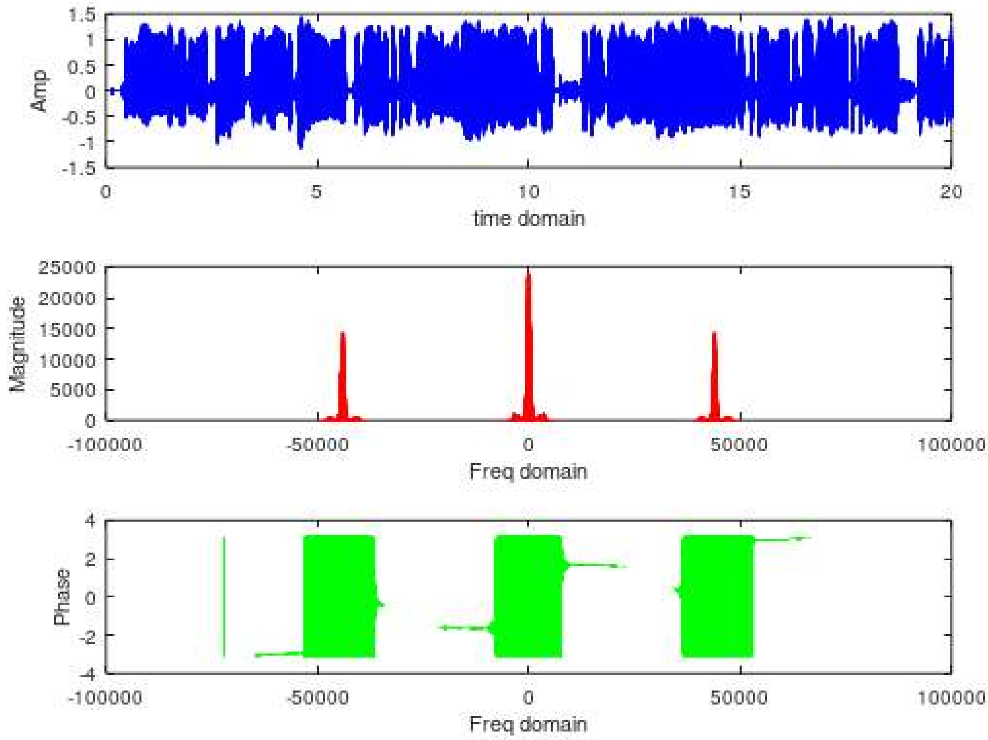
fc=fc1=10000 Hz



fc=fc2=30000 Hz

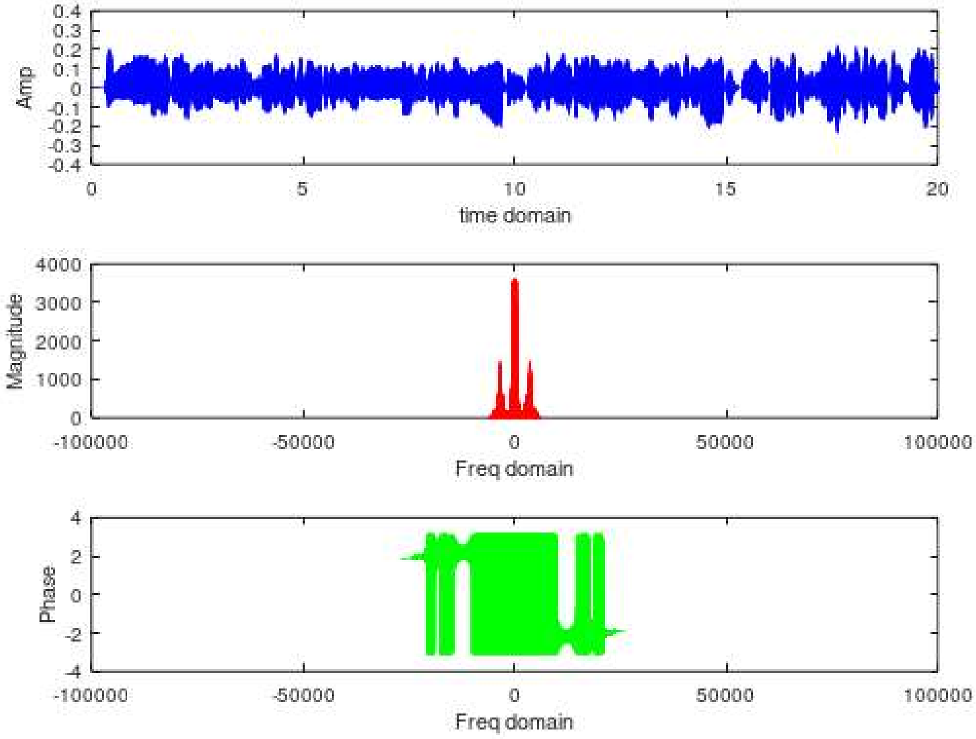


fc=fc3=50000 Hz

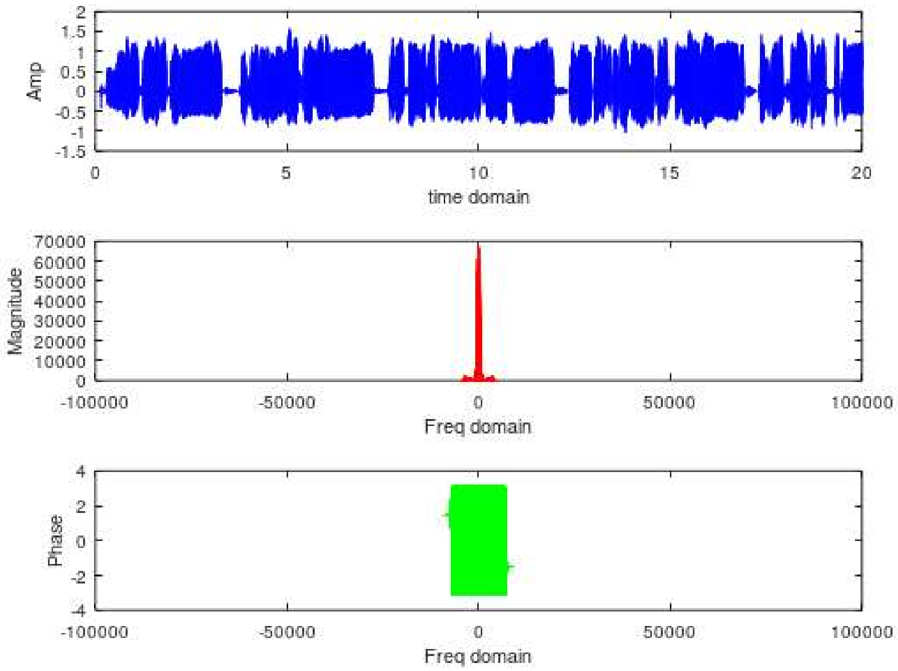


3-Applying LPF

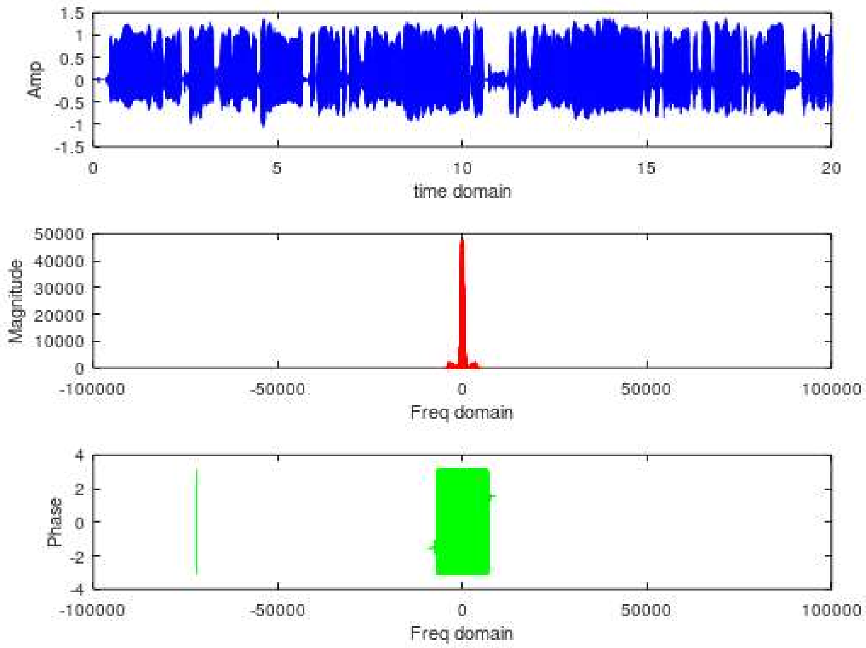
fc=fc1=10000 Hz



fc=fc2=30000 Hz

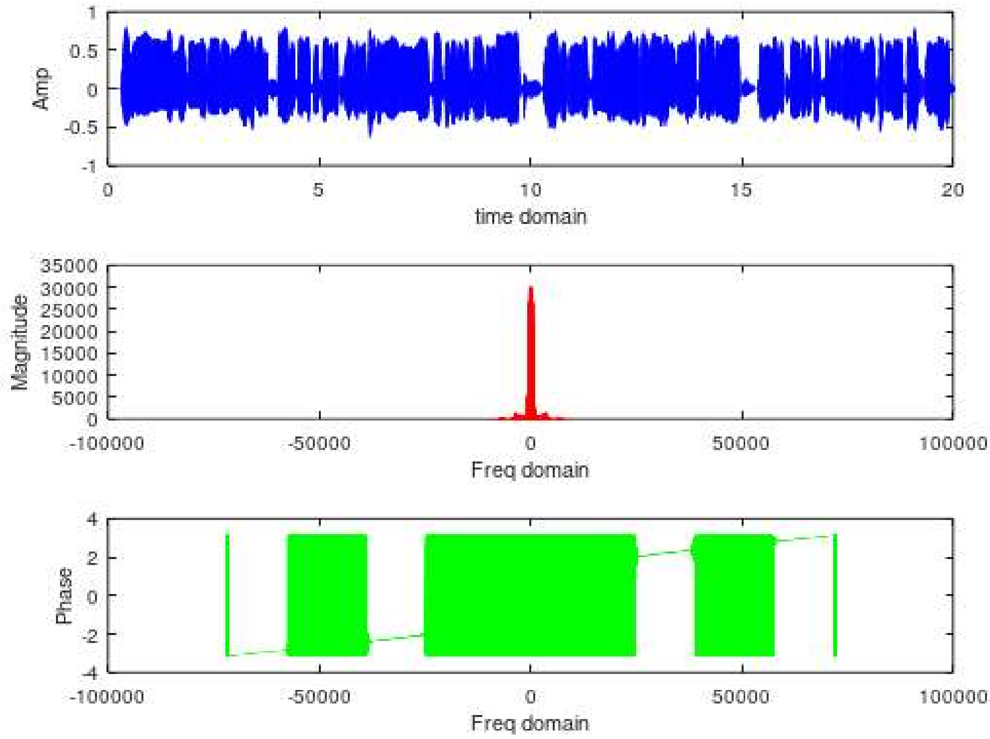


fc=fc3=50000 Hz

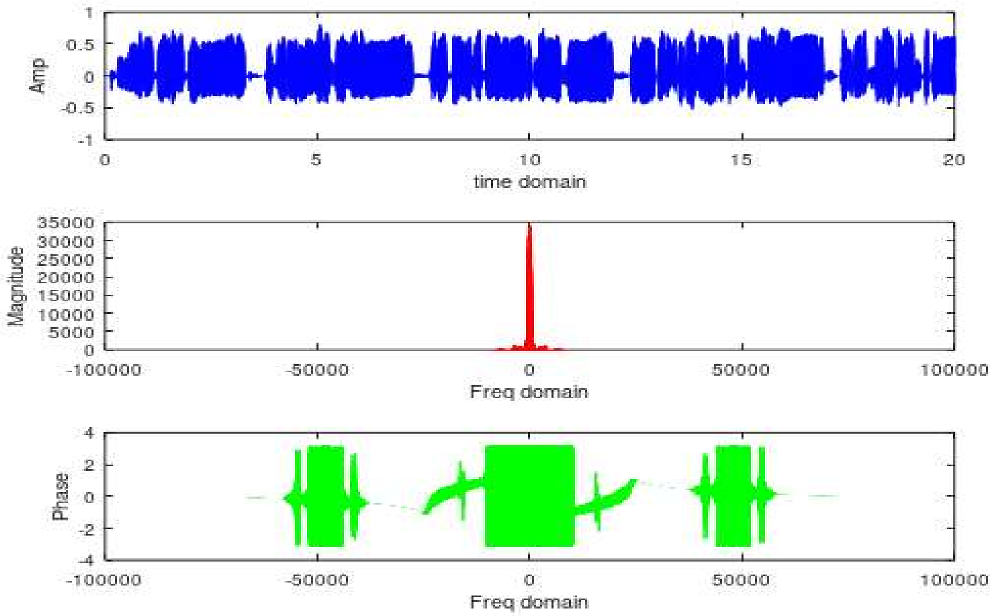


Original signals :

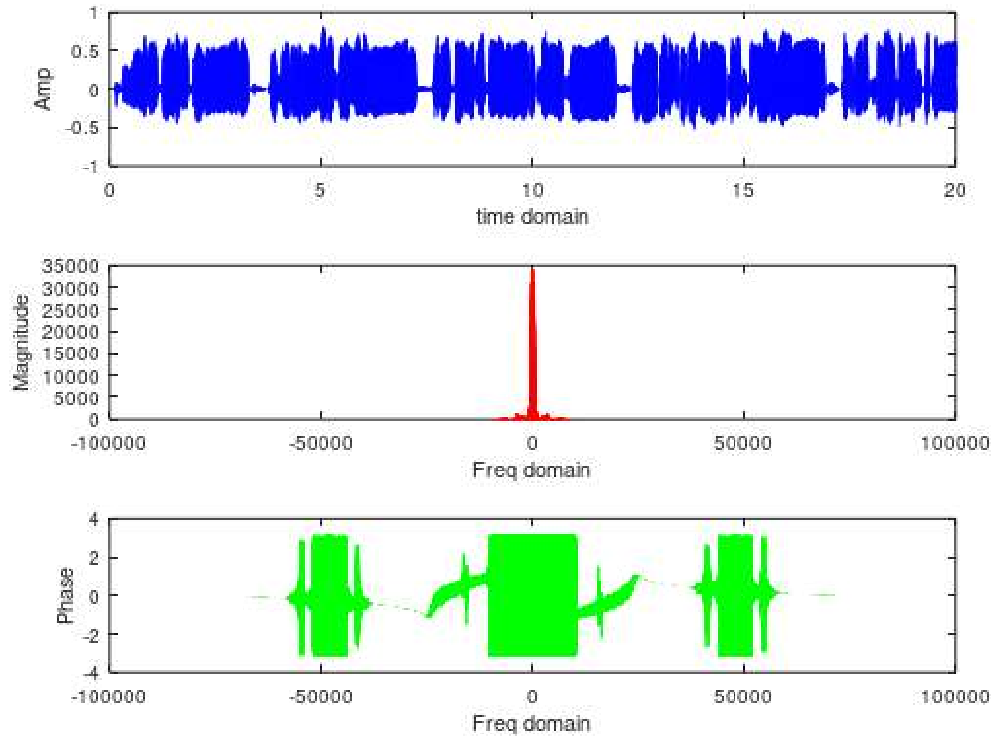
Baseband of first signal



Baseband of second signal



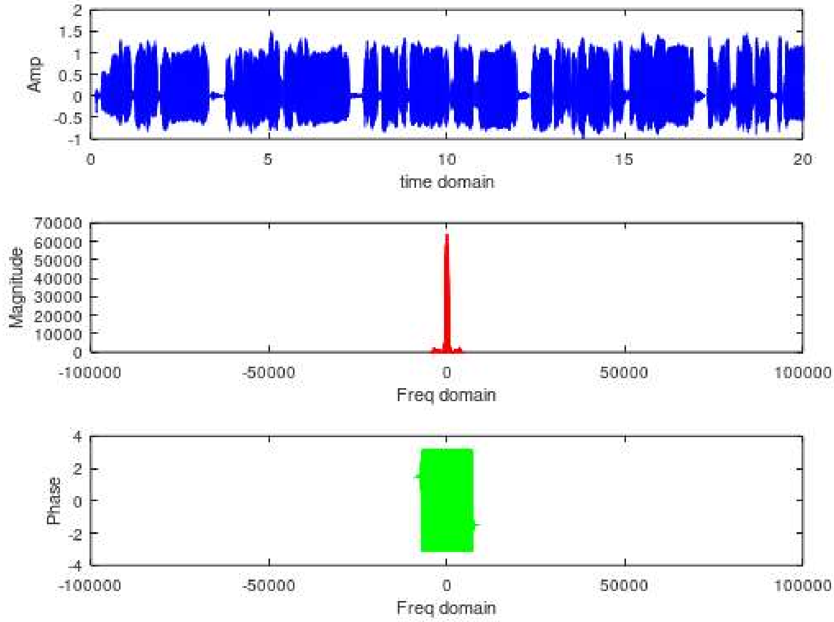
Baseband of third signal



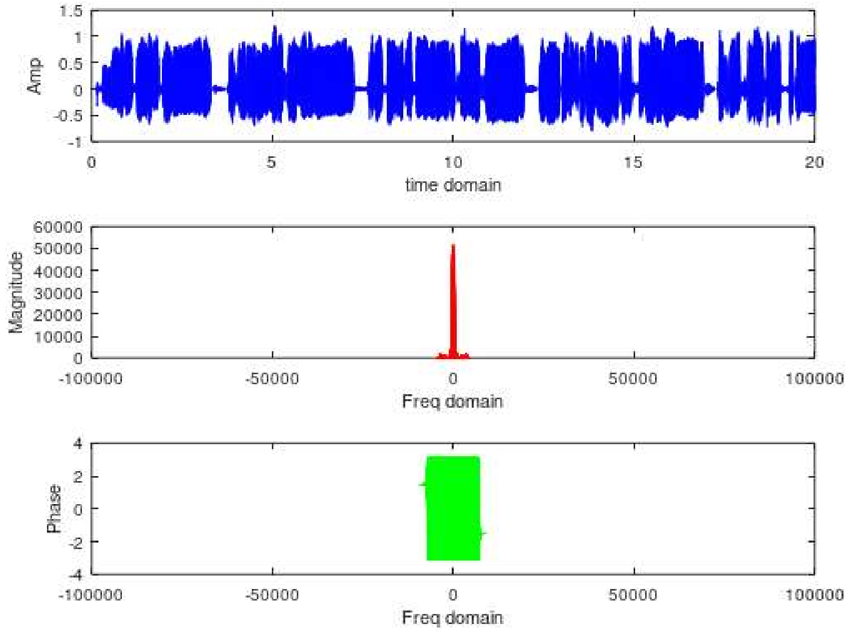
- The demodulated signals are almost as same as the original signals .
- The first and third modulated signal has little distortion
- (may be as the Bbf , Lpf are not ideal).
- The second modulated signal as same as the original with little attenuation.

4)

Phase error = 10

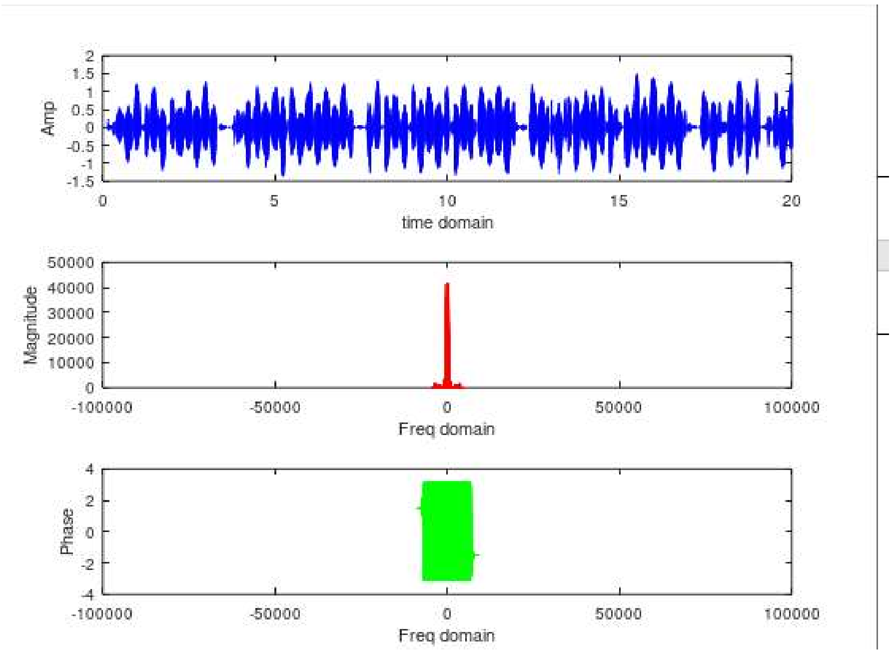


Phase error = 30

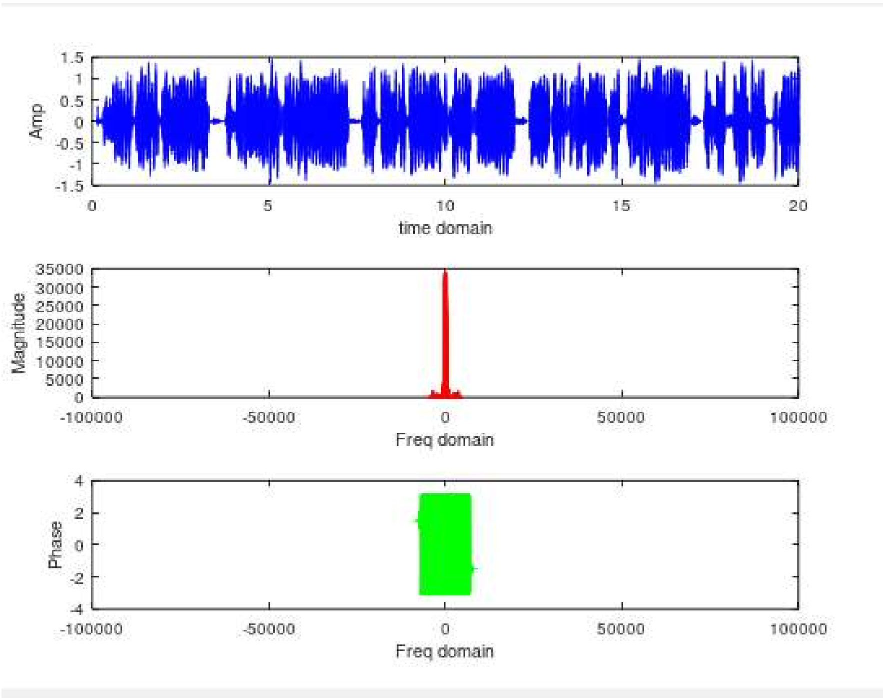


5)

frequency error = 2



frequency error = 10



6)

- The phase error may cause attenuation of the output signal without causing distortionas long as it is constant.
- When phase error =10 , the magnitude of the spectrum decreases
- Less than in case of   phase error =30.
- When phase error = 90 , the magnitude of the spectrum = zero and you should hear nothing.
- Octave might not be able to nullify the magnitude because the LBF , BPF are not ideal and it might fail to turn from deg to rad.

- When the output is multiplied by a low frequency (frequency error)sinusoid, this causes attenuation and distortion
  of the output signal.