EE352 – Communication Systems I Laboratory

Lab 4 Report

Double Sideband Supressed Carrier Modulation and Demodulation

Name: Korkut Emre Arslantürk **Number: 250206039**

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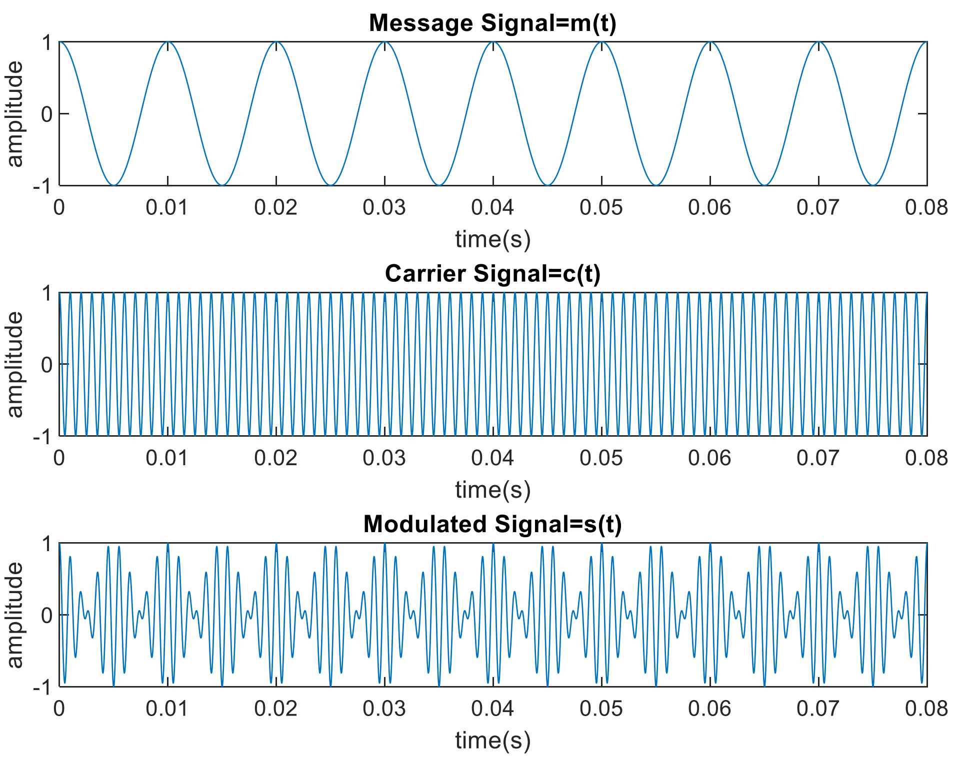
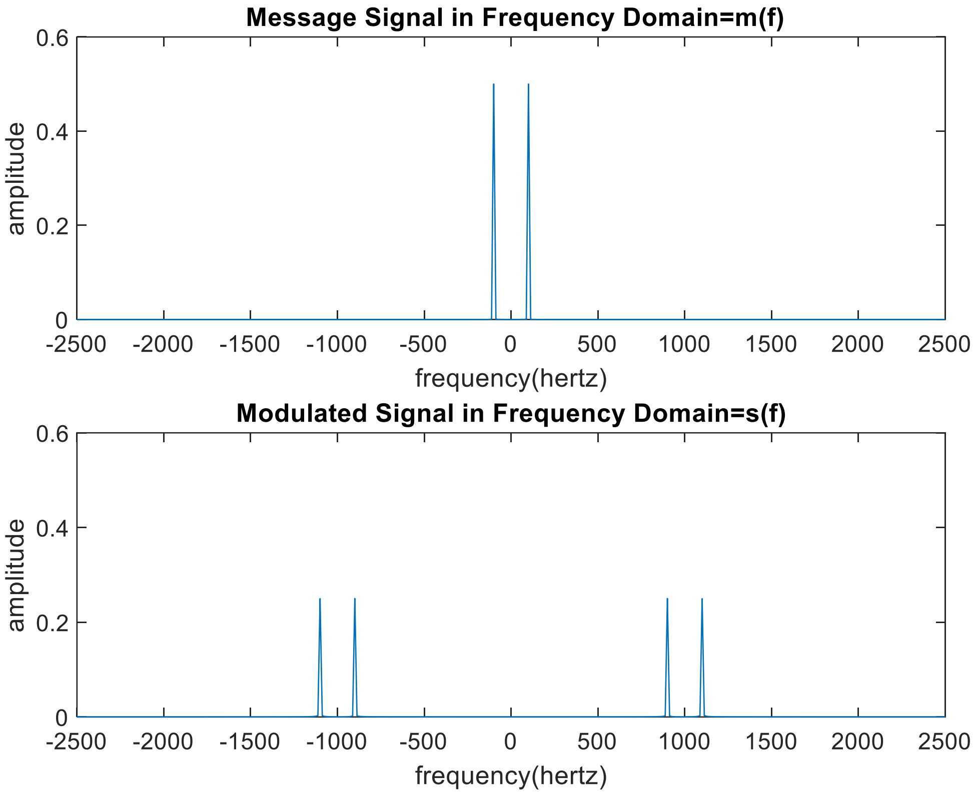
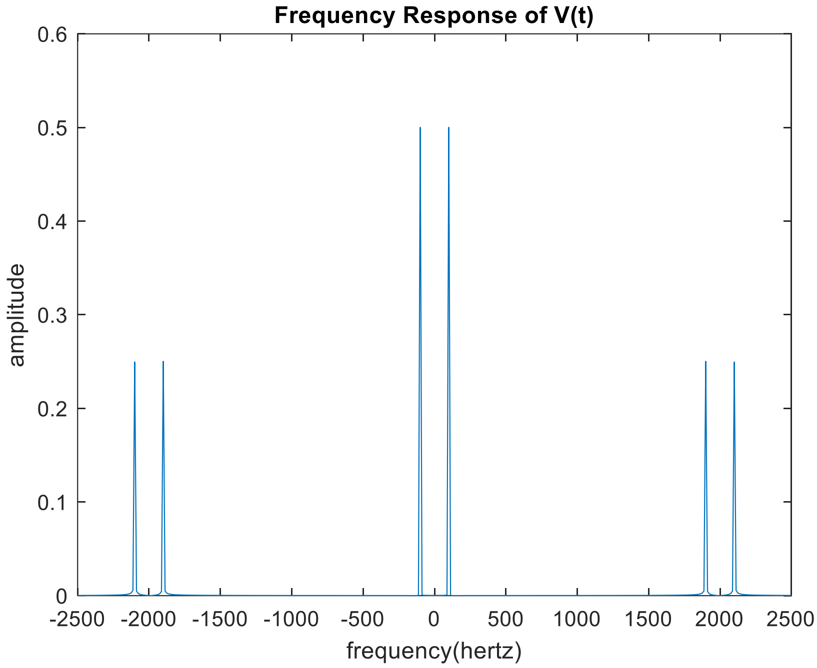


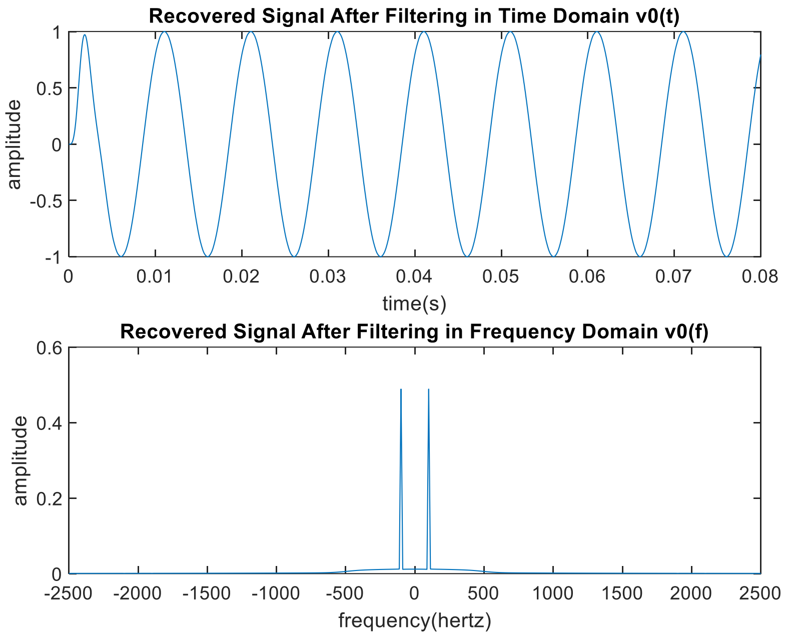
➔ According the this graph, in top of the figure we can see we get given message signal at given time where m(t)=cos(2*pi*f_m*t), f_m=100Hz and t=0.08s and we can see amplitude is 1. In middle of the figure we can see we get given carrier signal where c(t)=cos(2*pi*fc*t) and fc=1kHz and we can see amplitude is 1. In bottom of the figure we can see desired modulated signal in time domain which is product of message signal and carrier signal. We can say when frequency increasing we see more zero crossing.



➔ According to this graph, in top of the figure for message signal in frequency domain we can say we see magnitudes at -100 Hertz and +100 Hertz because our formula is m(t)=cos(2*pi*fm*t) and fm=100 Hertz. Also, our Am(message amplitude) is equal to 1 but we can see 0.5 amptlitude because of we have cos function in our message signal formula and because of fourier transform of cos formula our amptlitude is 1*(1/2)=0.5. In the bottom of the figure for modulated signal in frequency domain, we see amplitude at -+1100Hz, -+900Hz because of modulated signal is equal to product of c(t) and m(t) and our fc=1000Hz, fm =100 Hz, according to trigonometric sum product formulas we can say our amplitudes at fc+fm,fc-fm,-fc+fm,-fc-fm. Also, our amplitudes are 0.25 because we product m(t) and c(t) because of that our amplitude is 1 but we have 2 cos function because of fourier transform of formula our magnitudes are 1*(1/2)*(1/2)=1/4.



➔ According to this graph we can say we get V(t) fourier transform of result of product modulated signal and local oscillator . According to trigonometric sum product formulas we get amplitudes at 2fc+fm,2fc-fm,-2fc-fm,-2fc+m and we get amplitudes at +100Hertz and -100 Hertz because of our message signal frequency. For amplitudes at 2fc+fm, 2fc-fm, -2fc+fm, -2fc-fm, we can say our modulated signal amplitude is 0.25 and multiply it with local oscillator where local oscillator= Ac’*cos(2pi*fc) because of fourier transform we get 0.25*(1/2)=0.125 but our Ac’=2 so that our amplitude is 0.25. At +-100 Hertz we get 0.5 amplitude because our message signal amplitude is 1 and because of fourier transform of cos function our amplitude is 1*(1/2)=0.5



➔ We choose cut off frequency according to our message signal frequency and transmission line because of our filter is not ideal and we do not want to data loss. In this graph, we can see recovered signal after filtering, almost same with our message signal but in time domain we can see phase shifting because of our filter is not ideal and because of transmission line passing. In frequency domain we can say we get amplitudes at right frequency ,our amplitudes are 0.49 but it should be 0.5 it can be because of our filter is not ideal and we have data lose. Also we can see little bit deterioration.