
`%Exercise 2, DSB-SC Modulation and Demodulation`

```
close all;%close figures
clear all;%clear workspace
clc;%clear command window
```

```
fc = 300;    %frequency of sinusoid
fs=3000; % Sample frequency
t=-0.04:1/fs:0.04; %time vector
w=0.02; %width of discrete triangular plot
```

```
tp=-10e-3;
t1=tripuls(t-tp,w);%discrete triangular signal plot tp of width w
tp2=10e-3;
t2=tripuls(t-tp2,w);%discrete triangular signal plot tp2 of width w
m=t1-t2;    %difference of above triangular signals forms message
           signal
```

```
figure(1)
subplot(2,1,1);
plot(t,m); %time domain plot of message signal
xlabel('t');
ylabel('m(t)');
title('message signal, 14uec109');
hold on;
f=linspace(-fs/2,fs/2,1024);
subplot(2,1,2);
plot(f,abs(fftshift(fft(m,1024))));%frequency domain plot of message
           signal
xlabel('f');
ylabel('|M(f)|');
title('frequency domain representation of message signal, 14uec109');
```

```
ct=cos(2*pi*fc*t);
phi=(m.*ct);%DSB-SC signal
```

```
figure(2)
subplot(2,1,1);
plot(t,phi); %time domain plot of DSB-SC signal
xlabel('t');
ylabel('\phi(t)');
title('DSB-SC signal, 14uec109');
hold on;
subplot(2,1,2);
plot(f,abs(fftshift(fft(phi,1024))));%frequency domain plot of DSB-SC
           signal
xlabel('f');
ylabel('| \phi(f) |');
title('frequency domain representation of DSB-SC signal, 14uec109');
```

```
theta=pi/10;
et=2*phi.*cos(2*pi*fc*t+theta);%Demodulated signal
```

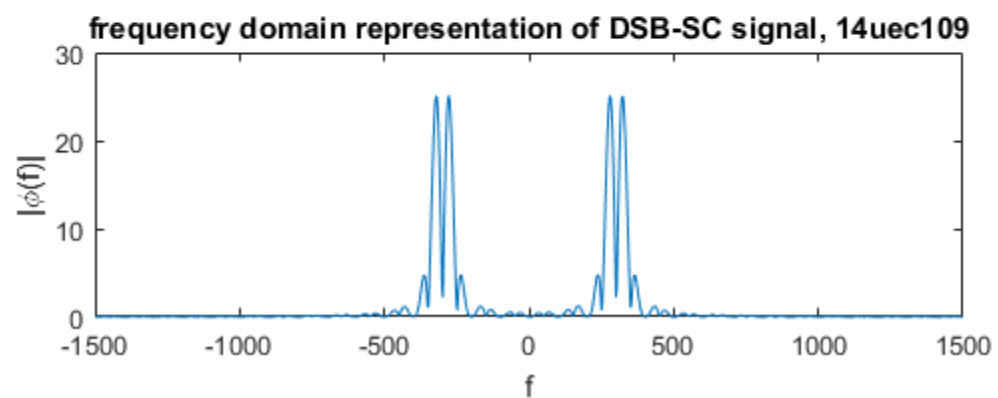
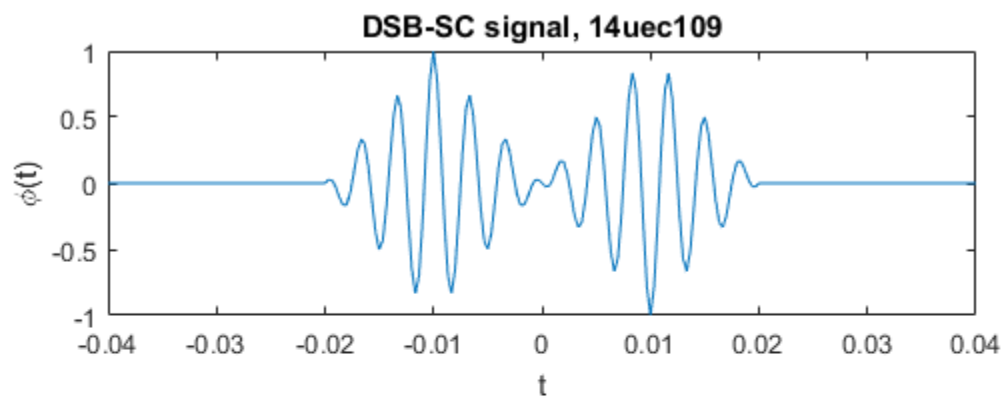
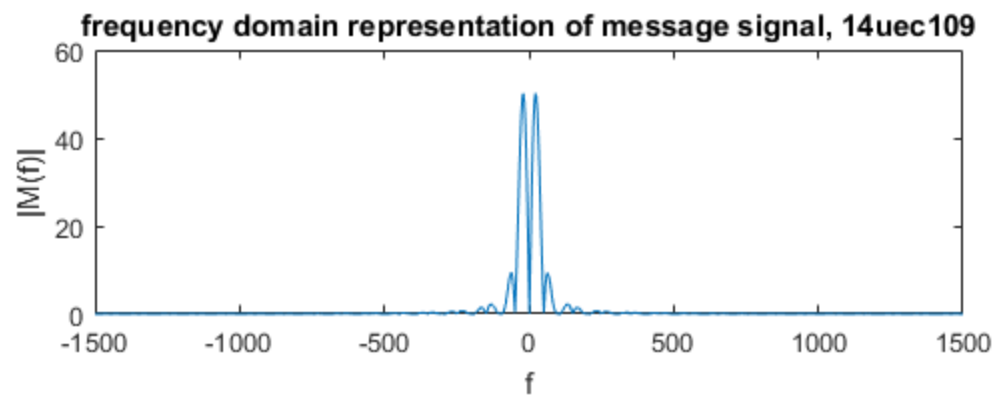
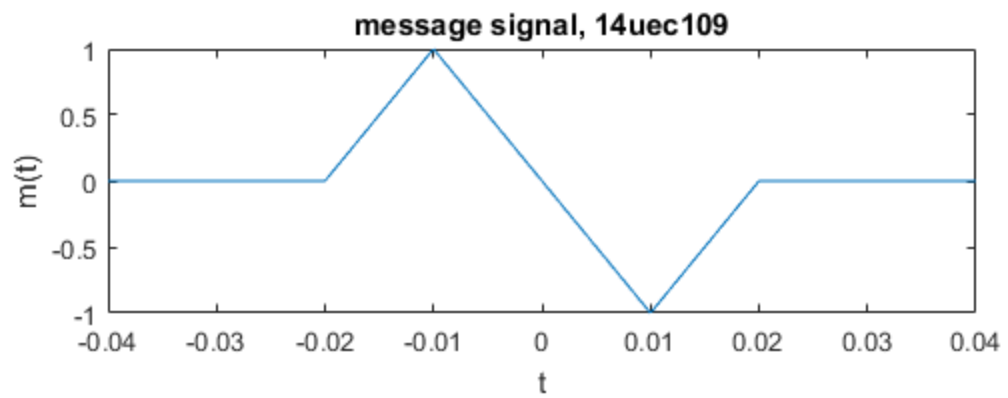
```

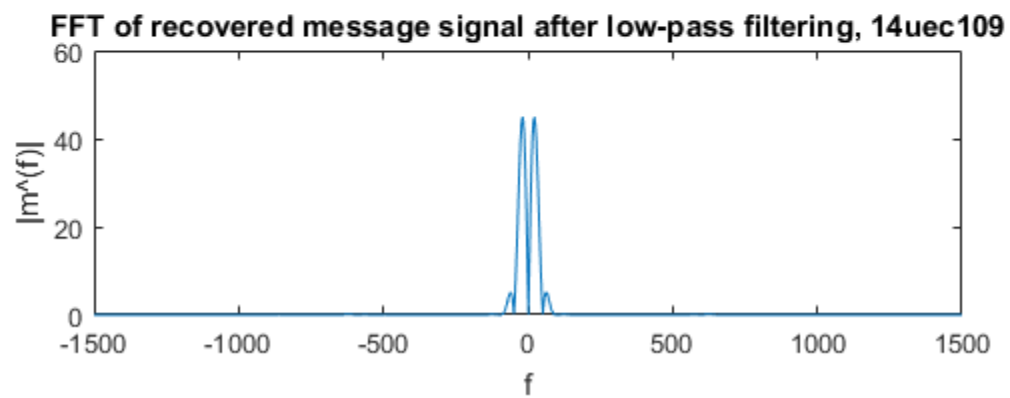
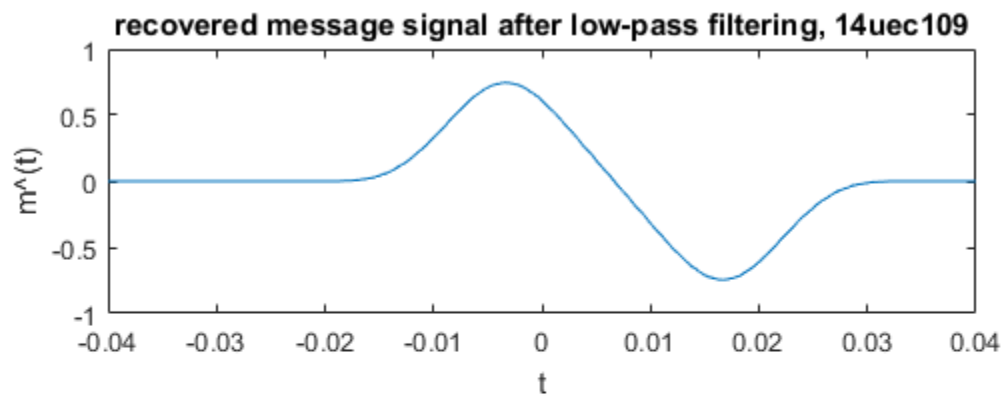
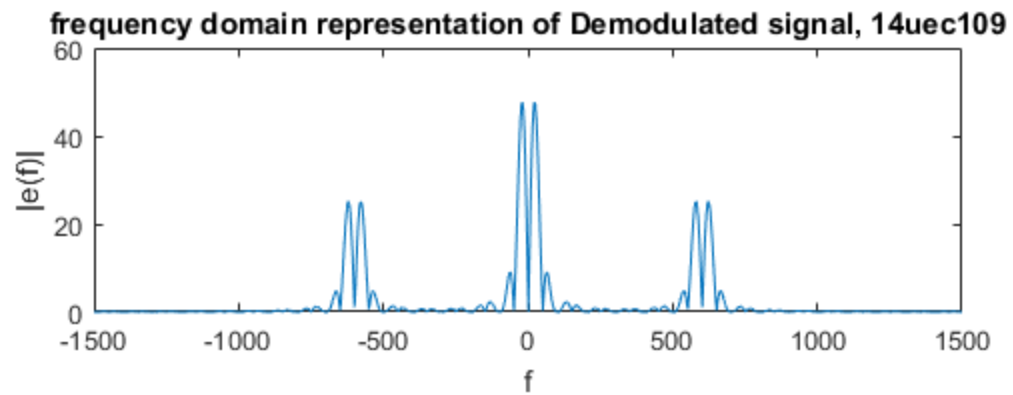
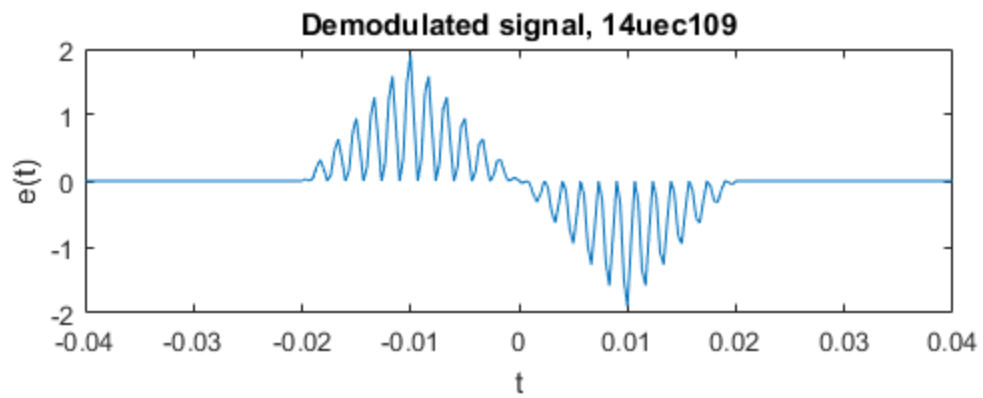
figure(3)
subplot(2,1,1);
plot(t,et); %time domain plot of Demodulated signal
xlabel('t');
ylabel('e(t)');
title('Demodulated signal, 14uec109');
hold on;
subplot(2,1,2);
plot(f,abs(fftshift(fft(et,1024))));%FFT plot of Demodulated signal
xlabel('f');
ylabel('|e(f)|');
title('frequency domain representation of Demodulated signal,
14uec109');

fill=fir1(40,1/150,'low'); %designing low pass filter
mes=filter(fill,1,et); %recovered message signal after low-pass
filtering

figure(4)
subplot(2,1,1);
plot(t,mes); %time domain plot of Recovered message signal after
LPF
xlabel('t');
ylabel('m^(t)');
title('recovered message signal after low-pass filtering, 14uec109');
hold on;
subplot(2,1,2);
plot(f,abs(fftshift(fft(mes,1024))));%frequency domain plot of
Recovered message signal after LPF
xlabel('f');
ylabel('|m^(f)|');
title('FFT of recovered message signal after low-pass filtering,
14uec109');

```





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