Contents

**Given Signals**

```
Am1= 1;
Am2= 1;
fm1 = 50;
fm2 = 50;
fc = 1000;
fc1 = 500;
N = 1e4;
t = 100*(-1/fm1):1/N:100*1/fm1;
x1 = Am1 * sinc(pi*fm1*t);
x2 = Am2 * (sinc(pi*fm2*t)).^2;
ct = cos(2*pi*fc*t);
ct1 = cos(2*pi*fc1*t);
```
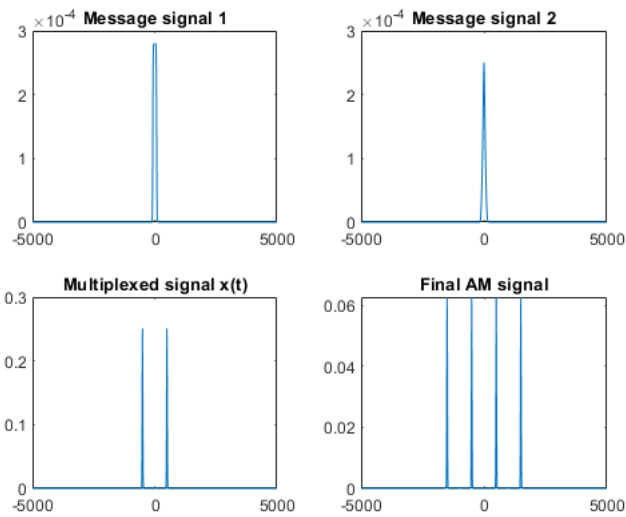
Mutliplexing

```
x = x1 + (1+x2).*ct1;
st = x.*ct;
figure;
subplot(2,2,1);
plot(t(18000:22000),x1(18000:22000));
title("Message Signal 1");
subplot(2,2,2);
plot(t(18000:22000),x2(18000:22000));

title("Message Signal 2");
subplot(2,2,3);
plot(t(18000:22000),x(18000:22000));
title("Multiplexed signal x");
subplot(2,2,4);
plot(t(18000:22000),st(18000:22000));
title("Final AM signal")
```
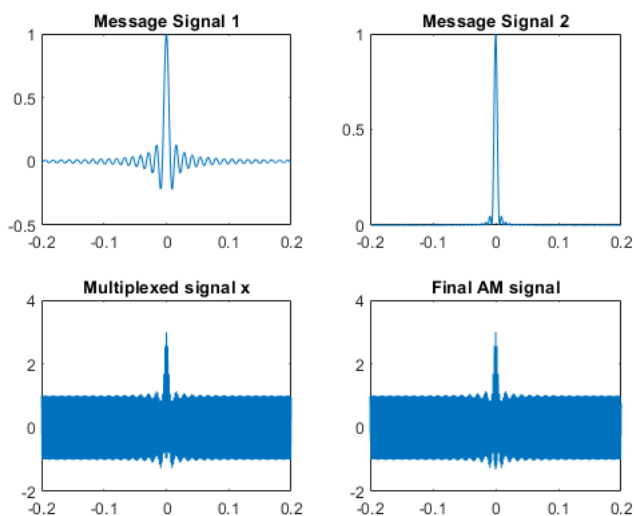

PSD of Message signals and Mux Signals

```
fs = N;
px1t = pwelch(x1,500,300,32768,fs,'centered','power');
ff = [-fs/2:fs/length(px1t):fs/2 - fs/length(px1t)];
px2t = pwelch(x2,500,300,32768,fs,'centered','power');
pxt = pwelch(x,500,300,32768,fs,'centered','power');
pst = pwelch(st,500,300,32768,fs,'centered','power');
figure;
subplot(2,2,1);
plot(ff,px1t);
title("Message signal 1");
subplot(2,2,2);
plot(ff,px2t);
title("Message signal 2");
subplot(2,2,3);
plot(ff,pxt);
title("Multiplexed signal x(t)");
subplot(2,2,4);
plot(ff,pst);
title("Final AM signal");
```

Demuxing

```
bpf_num = [-2.76958301397807e-05,8.67381322662034e-05,0.000167864048430882,0.000298856937454913,0.000464940132218577,0.000647220871821795,0.000817260312180122,
lpf_num = [-3.32634838873686e-05,-7.68443865098860e-06,-8.42424712673225e-06,-9.10541137924542e-06,-9.70462684826739e-06,-1.02075231053484e-05,-1.0589665375944
y1= st.*ct;
x1 = filter(lpf_num,1,y1);
y2 = filter(bpf_num,1,y1);
x2 = filter(abs(lpf_num),1,abs(y2));
figure;
subplot(2,1,1);
plot(t(18000:22000),x1(18000:22000))
title("DeMux Message signal 1");
subplot(2,1,2);
plot(t(18000:22000),x2(18000:22000));
title("DeMux Message signal 2");
```


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