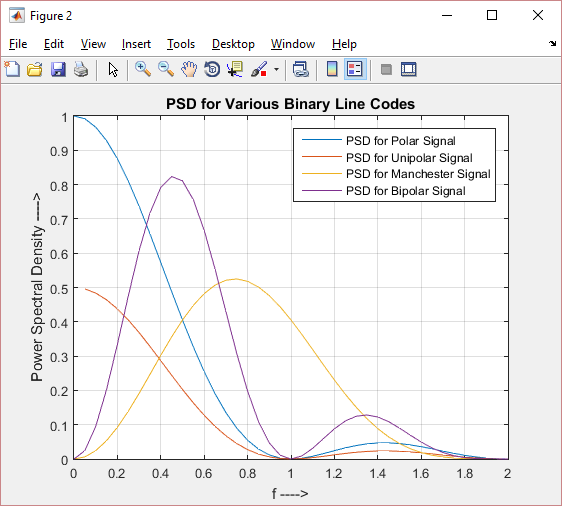
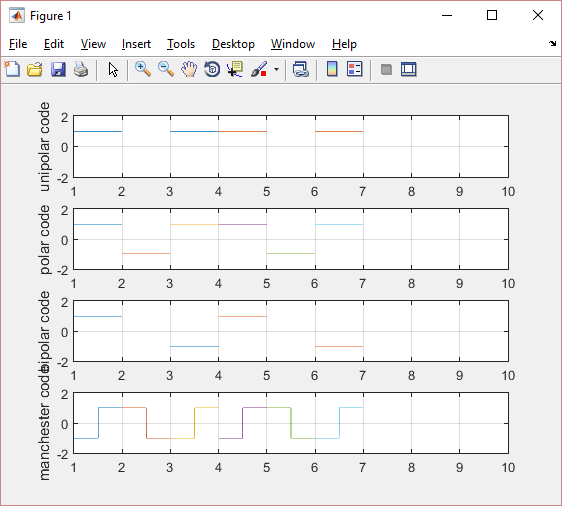
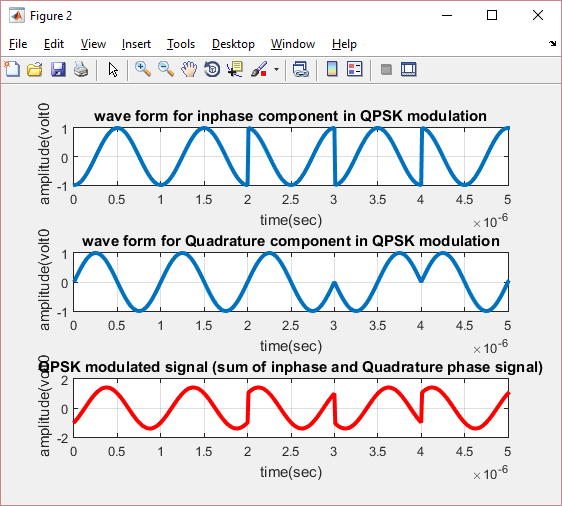
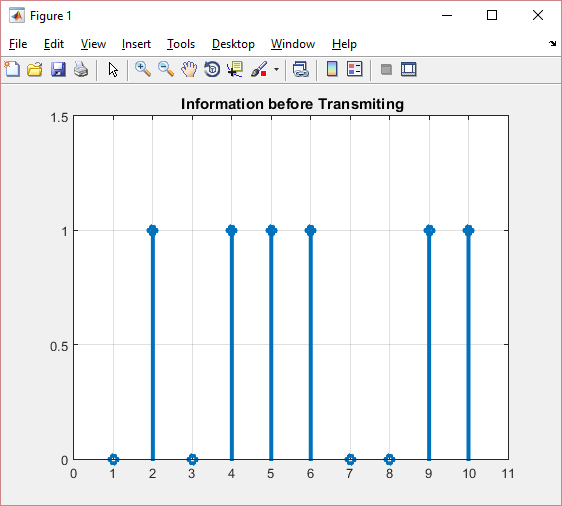
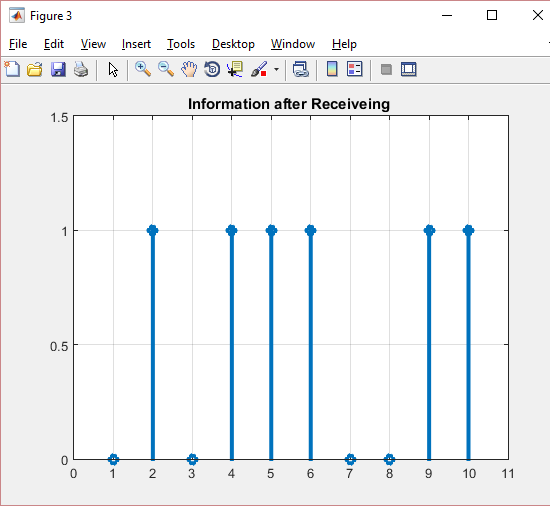
Digital Communication Report



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Aim: To execute FSK, ASK, PSK,QPSK, BPSK for a signal in Matlab and compare the Power Spectral Densities of the different types of line coding.

Theory:

Programs:

Line Coding techniques and their Power Spectral Densities –

clc;

close all;

clear all;

x=[1 0 1 1 0 1];

nx=size(x,2);

sign=1;

i=1;

while i<nx+1

t = i:0.001:i+1-0.001;

if x(i)==1

unipolar\_code=square(t\*2\*pi,100);

polar\_code=square(t\*2\*pi,100);

bipolar\_code=sign\*square(t\*2\*pi,100);

sign=sign\*-1;

manchester\_code=-square(t\*2\*pi,50);

else

unipolar\_code=0;

polar\_code=-square(t\*2\*pi,100);

bipolar\_code=0;

manchester\_code=square(t\*2\*pi,50);

end

subplot(4,1,1);

plot(t,unipolar\_code);

ylabel('unipolar code');

hold on;

grid on;

axis([1 10 -2 2]);

subplot(4,1,2);

plot(t,polar\_code);

ylabel('polar code');

hold on;

grid on;

axis([1 10 -2 2]);

subplot(4,1,3);

plot(t,bipolar\_code);

ylabel('bipolar code');

hold on;

grid on;

axis([1 10 -2 2]);

subplot(4,1,4);

plot(t,manchester\_code);

ylabel('manchester code');

hold on;

grid on;

axis([1 10 -2 2]);

i=i+1;

end

% Now we have to do PSD

%Input Parameters

Rb=1;

Tb=1/Rb;

f=0:0.05\*Rb:2\*Rb;

ax=f\*Tb;

% PSD of Polar Signal

P=Tb\*(sinc(ax).\*sinc(ax));

% figure(1)

% plot(f,P,'r')

% grid on

% box on

% xlabel('f ---->')

% ylabel('Power Spectral Density ---->')

% title('PSD for Polar Signal')

% PSD of Unipolar Signal

P1=0.5\*Tb\*(sinc(ax).\*sinc(ax))+ 0.5 \*dirac(f);

% figure(2)

% plot(f,P1,'r')

% grid on

% box on

% xlabel('f ---->')

% ylabel('Power Spectral Density ---->')

% title('PSD for Unipolar Signal')

% PSD of Manchester Signal

P2=Tb\*(sinc(ax/2)).^2.\*(sin(pi\*ax/2)).^2;

% figure(3)

% plot(f,P2,'r')

% grid on

% box on

% xlabel('f ---->')

% ylabel('Power Spectral Density ---->')

% title('PSD for Manchester Signal')

% PSD of Bipolar Signal

P3=Tb\*(sinc(ax/2)).^2.\*(sin(pi\*ax)).^2;

% hold on

% figure(4)

% plot(f,P3,'r')

% grid on

% box on

% xlabel('f ---->')

% ylabel('Power Spectral Density ---->')

% title('PSD for Bipolar Signal')

%Final PSD of Binary line codes

hold on

figure(2)

plot(f,P,f,P1,f,P2,f,P3)

grid on

box on

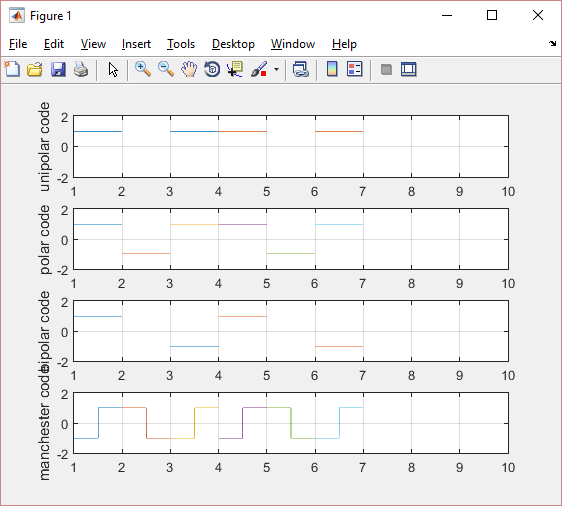
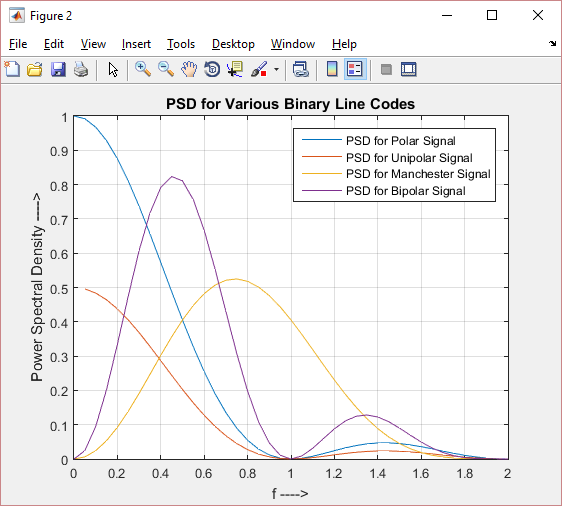
xlabel('f ---->')

ylabel('Power Spectral Density ---->')

title('PSD for Various Binary Line Codes')

legend('PSD for Polar Signal','PSD for Unipolar Signal','PSD for Manchester Signal','PSD for Bipolar Signal')

Output:



PSK:

Output:

FSK:

Output:

ASK:

Output:

QPSK :

clc;

clear all;

close all;

data=[0 1 0 1 1 1 0 0 1 1]; % information

%Number\_of\_bit=1024;

%data=randint(Number\_of\_bit,1);

figure(1)

stem(data, 'linewidth',3), grid on;

title(' Information before Transmiting ');

axis([ 0 11 0 1.5]);

data\_NZR=2\*data-1; % Data Represented at NZR form for QPSK modulation

s\_p\_data=reshape(data\_NZR,2,length(data)/2); % S/P convertion of data

br=10.^6; %Let us transmission bit rate 1000000

f=br; % minimum carrier frequency

T=1/br; % bit duration

t=T/99:T/99:T; % Time vector for one bit information

% XXXXXXXXXXXXXXXXXXXXXXX QPSK modulatio XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

y=[];

y\_in=[];

y\_qd=[];

for(i=1:length(data)/2)

y1=s\_p\_data(1,i)\*cos(2\*pi\*f\*t); % inphase component

y2=s\_p\_data(2,i)\*sin(2\*pi\*f\*t) ;% Quadrature component

y\_in=[y\_in y1]; % inphase signal vector

y\_qd=[y\_qd y2]; %quadrature signal vector

y=[y y1+y2]; % modulated signal vector

end

Tx\_sig=y; % transmitting signal after modulation

tt=T/99:T/99:(T\*length(data))/2;

figure(2)

subplot(3,1,1);

plot(tt,y\_in,'linewidth',3), grid on;

title(' wave form for inphase component in QPSK modulation ');

xlabel('time(sec)');

ylabel(' amplitude(volt0');

subplot(3,1,2);

plot(tt,y\_qd,'linewidth',3), grid on;

title(' wave form for Quadrature component in QPSK modulation ');

xlabel('time(sec)');

ylabel(' amplitude(volt0');

subplot(3,1,3);

plot(tt,Tx\_sig,'r','linewidth',3), grid on;

title('QPSK modulated signal (sum of inphase and Quadrature phase signal)');

xlabel('time(sec)');

ylabel(' amplitude(volt0');

% XXXXXXXXXXXXXXXXXXXXXXXXXXXX QPSK demodulation XXXXXXXXXXXXXXXXXXXXXXXXXX

Rx\_data=[];

Rx\_sig=Tx\_sig; % Received signal

for(i=1:1:length(data)/2)

%%XXXXXX inphase coherent dector XXXXXXX

Z\_in=Rx\_sig((i-1)\*length(t)+1:i\*length(t)).\*cos(2\*pi\*f\*t);

% above line indicat multiplication of received & inphase carred signal

Z\_in\_intg=(trapz(t,Z\_in))\*(2/T);% integration using trapizodial rull

if(Z\_in\_intg>0) % Decession Maker

Rx\_in\_data=1;

else

Rx\_in\_data=0;

end

%%XXXXXX Quadrature coherent dector XXXXXX

Z\_qd=Rx\_sig((i-1)\*length(t)+1:i\*length(t)).\*sin(2\*pi\*f\*t);

%above line indicat multiplication ofreceived & Quadphase carred signal

Z\_qd\_intg=(trapz(t,Z\_qd))\*(2/T);%integration using trapizodial rull

if (Z\_qd\_intg>0)% Decession Maker

Rx\_qd\_data=1;

else

Rx\_qd\_data=0;

end

Rx\_data=[Rx\_data Rx\_in\_data Rx\_qd\_data]; % Received Data vector

end

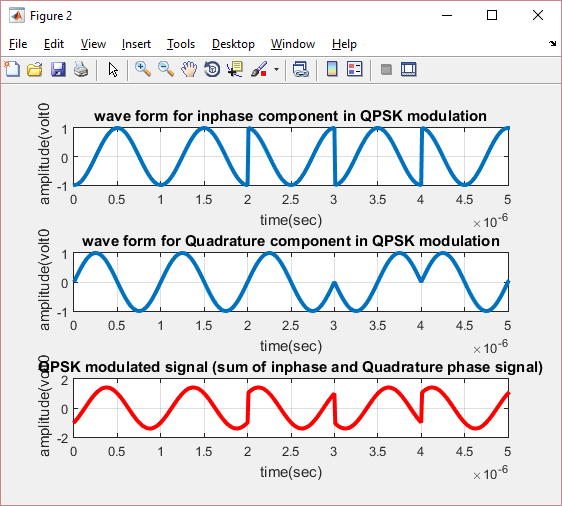
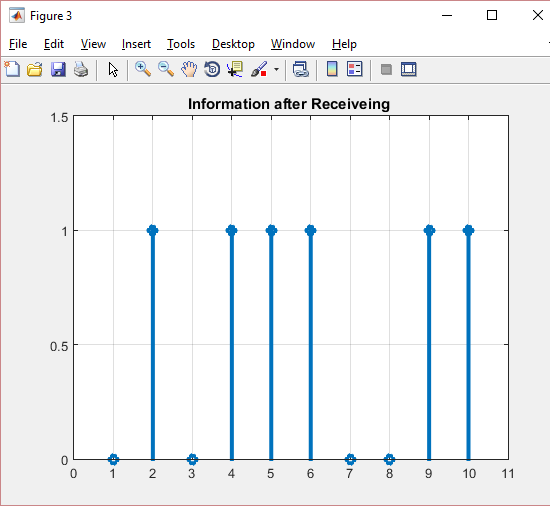
figure(3)

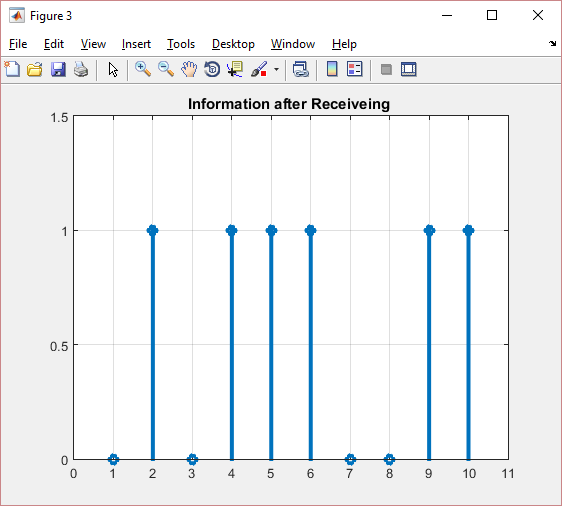
stem(Rx\_data,'linewidth',3)

title('Information after Receiveing ');

axis([ 0 11 0 1.5]), grid on;

Output:





BPSK:

Output:

Result: The ASK, FSK, PSK, QPSK and BPSK for a signal were plotted and the Power spectral densities of the different types of line encoding were compared.