

DC AHP-6

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Semester: 4th

Section:'B'

Code:

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%dc_ahp6
clc;
clear all;
close all;
Type='Bipolar NRZ';
Rb=100;
Tr=0.001;
Tb=1/Rb;
Ttotal=1000;
NcorrX=100;
NcorrA=10;
Nfft=512;
t=[0:Tr:Ttotal];
t=t(1:end-1);
Nsamples=length(t);
Nfactor=(Tb/Tr);
Nbits=Ttotal*Rb;
At=double(randn(1,Nbits)>0);
SxfAxis=[-200 2000 0 60];
switch Type
case 'Unipolar NRZ'
PulseShape=ones(1,Nfactor);
SxfAxis=[-200 200 0 60];
case 'Unipolar RZ'
PulseShape=[ones(1,Nfactor/2) zeros(1/Nfactor/2)];
SxfAxis=[-250 250 0 20];
case 'Polar NRZ'
At=2*At-1;
PulseShape=ones(1,Nfactor);
SxfAxis=[-200 200 0 20];
case 'Polar RZ'
At=2*At-1;
PulseShape=[ones(1,Nfactor/2) zeros(1/Nfactor/2)];
SxfAxis=[-250 250 0 10];
case 'Bipolar NRZ'
Aindex=find(At);
Aindex=downsample(Aindex,2,1);
At(Aindex)=-1;

PulseShape=ones(1,Nfactor);
SxfAxis=[-200 200 0 10];
otherwise
At=2*At-1;
PulseShape=[ones(1,Nfactor/2) -ones(1,Nfactor/2)];
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SxfAxis=[-250 250 0 10];
end
Xt=kron(At,PulseShape);
figure;
subplot(221);
plot(t(1:250),Xt(1:250));
grid on;
axis([0 0.25 -2 2]);
sgtitle([Type, 'with R_b=100bps'])
title('X(t)');
rAt=xcorr(At,NcorrA)./Nbits;
subplot(222);
stem([-NcorrA:NcorrA],rAt);
grid on;
title('R_A(n)');
rxt=xcorr(Xt,NcorrX)./Nsamples;
subplot(223);
plot([-NcorrX*Tr:Tr:NcorrX*Tr],rxt);
grid on;
title('R_x(tau)');
f=((-Nfft/2):(Nfft/2)-1)/(Nfft*Tr);
Sxf=abs(fftshift(fft(rxt,Nfft)));
subplot(224);
plot(f,Sxf);
grid on;
axis(SxfAxis);
title('S_X(f)');
clc;
clear all;
close all;
Type='Bipolar NRZ';
Rb=100;
Tr=0.001;
Tb=1/Rb;
Ttotal=1000;
NcorrX=100;
NcorrA=10;
Nfft=512;
t=[0:Tr:Ttotal];
t=t(1:end-1);
Nsamples=length(t);
Nfactor=(Tb/Tr);
Nbits=Ttotal*Rb;
At=double(randn(1,Nbits)>0);
SxfAxis=[-200 2000 0 60];
switch Type
case 'Unipolar NRZ'
PulseShape=ones(1,Nfactor);
SxfAxis=[-200 200 0 60];
case 'Unipolar RZ'
PulseShape=[ones(1,Nfactor/2) zeros(1/Nfactor/2)];
SxfAxis=[-250 250 0 20];
case 'Polar NRZ'
At=2*At-1;
PulseShape=ones(1,Nfactor);
SxfAxis=[-200 200 0 20];
case 'Polar RZ'
At=2*At-1;
PulseShape=[ones(1,Nfactor/2) zeros(1/Nfactor/2)];

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```

SxfAxis=[-250 250 0 10];
case 'Bipolar NRZ'
Aindex=find(At);
Aindex=downsample(Aindex,2,1);
At(Aindex)=-1;

PulseShape=ones(1,Nfactor);
SxfAxis=[-200 200 0 10];
otherwise
At=2*At-1;
PulseShape=[ones(1,Nfactor/2) -ones(1,Nfactor/2)];
SxfAxis=[-250 250 0 10];
end
Xt=kron(At,PulseShape);
figure;
subplot(221);
plot(t(1:250),Xt(1:250));
grid on;
axis([0 0.25 -2 2]);
sgtitle([Type,'with R_b=100bps'])
title('X(t)');
rAt=xcorr(At,NcorrA)./Nbits;
subplot(222);
stem([-NcorrA:NcorrA],rAt);
grid on;
title('R_A(n)');
rxt=xcorr(Xt,NcorrX)./Nsamples;
subplot(223);
plot([-NcorrX*Tr:Tr:NcorrX*Tr],rxt);
grid on;
title('R_x(tau)');
f=(-Nfft/2):(Nfft/2)-1)/(Nfft*Tr);
Sxf=abs(fftshift(fft(rxt,Nfft)));
subplot(224);
plot(f,Sxf);
grid on;
axis(SxfAxis);
title('S_X(f)');

```

Output:



