Experiment 5

Sectioned Convolution: Overlap Save and Overlap Add Method for long Duration Sequences

Overlap save

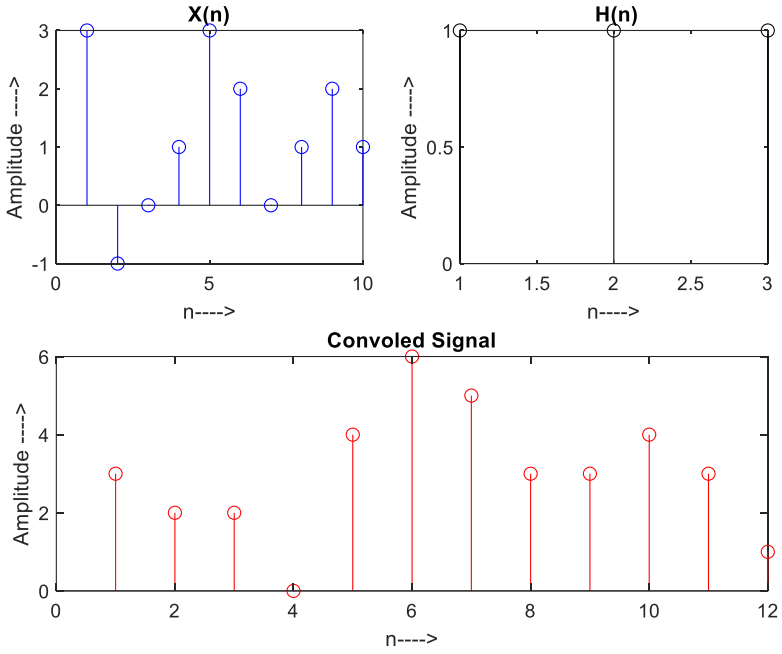
```
clc;
clear all;
close all;
x=input('Enter 1st Sequence X(n)= ');
h=input('Enter 2nd Sequence H(n)= ');
N=input('Enter length of each block N = ');

% Code to plot X(n)
subplot(2,2,1);
stem(x,'blue');
xlabel ('n---->');
ylabel ('Amplitude ---->');
title('X(n)');

%Code to plot H(n)
subplot(2,2,2);
stem(h,'black');
xlabel ('n---->');
ylabel ('Amplitude ---->');
title(' H(n)');

% Code to perform Convolution using Overlap Save Method
lx=length(x);
lh=length(h);
m=lh-1;
x=[zeros(1,m) x zeros(1,N)];
h=[h zeros(1,N-lh)];
L=N-lh+1;
k=floor(lx/L);
for i=0:k
y=x(1,i*L+1:i*L+N);
q=cconv(y,h,N)
%q=C_Conv(y,h);  %Call the C_Conv function.
p(i+1,:)=q;
end
p1=p(:,lh:N)';
p=p1(:)'

% Representation of the Convoled Signal
subplot(2,2,3:4);
```

```
stem(p,'red');
xlabel ('n---->');
ylabel ('Amplitude ---->');
title('Convoled Signal');
```

Output

Enter 1st Sequence X(n)= [3,-1,0,1,3,2,0,1,2,1]
Enter 2nd Sequence H(n)= [1, 1,1]
Enter length of each block L = 8
p =

3 2 2 0 4 6 5 3 3 4 3 1



Overlap add

```
close all;
```

```
clear all;
x=input('Enter First Sequence x[n]= ');
h=input('Enter Second Sequence h[n]= ');
N=input('Enter length of each block N = ');
Lx=length(x);
M=length(h);
L=N-M+1;
K=ceil(Lx/L)
R=rem(Lx,L);
%Padding zeros to input sequences to make length equal to
N
if R>0
 x=[x zeros(1,L-R)]
end
h=[h zeros(1,N-M)]
%Initialising the Output
y=zeros(N,K);
%Padding zeros to Input sequence at the end of the
sequence
z=zeros(1,M-1);
%To perform Circular Convolution of two input sequences
for i=0:K-1
 Xn=x(L*i+1:L*i+L);
 Xi=[Xn z];
 u(i+1,:)=cconv(Xi,h,N) %u(i+1,:)=C_Conv(Xi(i,:),h);
end
Y=u';
M1=M-1;
p=L+M1;
for i=1:K-1
 u(i+1,1:M-1)=u(i,p-M1+1:p)+u(i+1,1:M-1);
end
z1=u(:,1:L)'
y1=(z1(:))'
y=[y1 u(K,(M:N))]
%Ploting the Input Sequences
subplot (2,2,1);
stem(x);
title('First Sequence x[n]');
xlabel ('Samples');
ylabel ('Amplitude');
subplot (2,2,2);
stem(h);
title('Second Sequence h[n]');
xlabel ('Samples');
ylabel ('Amplitude');
%Plotting of the Convoled Signal
```

```
subplot (2,2,3:4);
stem(y);
title ('Convolved Signal');
xlabel ('Samples');
ylabel ('Amplitude');
```

Result

Enter First Sequence x[n]= [1 2 -1 2 3 -2 -3 -1 1 1 2 -1]
Enter Second Sequence h[n]= [1 2]
Enter length of each block N = 4

K =

4

h =

1 2 0 0

u =

1 4 3 -2

u =

1 4 3 -2
2 7 4 -4

u =

1 4 3 -2
2 7 4 -4
-3 -7 -1 2

u =

1 4 3 -2

```
   2    7    4   -4
  -3   -7   -1    2
   1    4    3   -2
```

z1 =

```
   1    0   -7    3
   4    7   -7    4
   3    4   -1    3
```

y1 =

```
   1    4    3    0    7    4   -7   -7   -1    3    4    3
```

y =

```
   1    4    3    0    7    4   -7   -7   -1    3    4    3    4    3   -2
```