Experiment No: 5 Date:12/09/2024

LINEAR CONVALUTION USING CIRCULAR CONVALUTION AND VICE VERSA

Aim

To perform linear convolution using circular convolution and vice versa using Matlab

Theory

Linear Convolution using Circular Convolution:

To compute linear convolution through circular convolution, the input sequences are padded with zeros to a length of $N = L + M - 1$, where L and M are the lengths of the two sequences. This padding ensures that the circular convolution produces the same result as linear convolution. Once padded, applying circular convolution to these sequences will yield the linear convolution outcome.

Circular Convolution using Linear Convolution:

Circular convolution can be derived from linear convolution by first applying linear convolution to two sequences of length N. Then, the result is adjusted by wrapping around or adding the overlapping elements to match the original sequence length N, usually using modulo N.

PROGRAM

a)Linear Convolution using Circular Convolution:

```
clc;
clear;
close;
clf;
x=[1 2 3 4];
h=[1 1 1 ];
xl=length(x);
hl=length(h);
```

OBSERVATION

OUTPUT:

a)Linear Convolution using Circular Convolution:

1 3 6 9 7 4

1 3 6 9 7 4

b)Circular Convolution using Linear Convolution:

8 7 6 9

```
zl=(xl+hl)-1;
xn=[x zeros(1,zl-xl)];
hn=[h zeros(1,zl-hl)];
xa=fft(xn);
ha=fft(hn);
ans=xa.*ha
anss=ifft(ans);
disp(anss);
answ=conv(x,h);
disp(answ);
```

b)Circular Convolution using Linear Convolution:

```
clc;
clear;
close;
clf;
x=[1 2 3 4];
h=[1 1 1];
y=conv(x,h);
z=max(length(x),length(h));
r= [y(1:z)];
new = [y(z+1:length(y)) zeros(1,length(y)-z)] ;
for k=1:z-1;
    r(k)=r(k)+new(k);
end
disp(r);
```

RESULT

Performed linear convolution using circular convolution and vice versa using scilab.