OVERLAP SAVE AND OVERLAP ADD METHOD

Aim

Theory

a)Overlap Save Method

The overlap-save method splits a long input signal into overlapping segments. Each segment, with a length slightly longer than the filter, is convolved using FFT, and the initial overlapping points are discarded to avoid circular convolution artifacts. This method ensures smooth output by processing small blocks of data sequentially.

b)Overlap Add Method

The overlap-add method divides the signal into non-overlapping segments, which are zero-padded and convolved using FFT. The resulting outputs from consecutive segments are overlapped by a portion equal to the filter length and added together. This approach is efficient for handling long convolutions and is widely used in real-time signal processing.

Program

a)Overlap Save Method

```
clc;
clear all;
close all;
x=input("Enter sequence 1");
h=input("Enter sequence 2");
N=input('Enter length to divide');
if N<length(h)
   disp('not possible');
else
    xl=length(x);
    hl=length(h);
    L=N-hl+1;
```

OBSERVATION

a)Overlap Save Method

INPUT

Enter sequence 1

[1 1 0 0 0 1 1 -1 1]

Enter sequence 2

[1 1 1]

Enter length to divide

3

OUTPUT

1   2   2   1   0   1   2   1   1   0   1

b)Overlap Add Method

INPUT

Enter the input sequence: [0 1 2 3 4 5 6 7 8 9]

Enter the filter sequence: [1 0 1]

Enter the segment length (choose N >= Lh): 3

OUTPUT

convoluted sequence: 0 1 2 4 6 8 10 12 14 16 8 9

```
    hnew=[h zeros(1,N-hl)];

    xnew=[zeros(1,hl-1),x,zeros(1,N-1)];

    y=[];

for i=1:L:length(xnew)-N+1

    XB=xnew(i:i+N-1);

    YB=ifft(fft(XB).*fft(hnew));

    y=[y,YB(hl:end)];

end

    disp(y(1:xl+hl-1));

end
```

b)Overlap Add Method

```
clc;

clear all;

close all;

x = input('Enter the input sequence: ');

h = input('Enter the filter sequence: ');

Lx = length(x);

Lh = length(h);

N = input('Enter the segment length (choose N >= Lh): ');

if N < Lh

    error('Segment length N must be greater than or equal to filter
length');

end

x = [x, zeros(1, N - mod(Lx, N))];

Lx_padded = length(x);

y = zeros(1, Lx_padded + Lh - 1);

for i = 1:N:Lx_padded

    x_segment = x(i:i+N-1);

    y_segment = conv(x_segment, h);
```

```
y(i:i+length(y_segment)-1) = y(i:i+length(y_segment)-1)}+y_segment;
end
y = y(1:Lx + Lh - 1);
disp('convoluted sequence:');
disp(y);
```

Result

Implemented overlap add and overlap save method using MATLAB and verified the output.