**作业一**

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**1.convOperation.m文件—卷积实现函数**

function [y, ny] = convOperation(x, nx, h, nh)

nyBegin = nx(1) + nh(1);

nyEnd = nx(length(x)) + nh(length(h));

ny = [nyBegin : nyEnd];

[h, nh] = sigfold(h, nh);

y = zeros(1, length(ny));

k=1;

for i = nyBegin : nyEnd

[hTemp, nTemp] = sigshift(h, nh, i);

[temp,nTemp] = sigmult(x, nx, hTemp, nTemp);

y(k) = sum(temp);

k = k + 1;

end

function [y,n]=sigfold(x,n)

y=fliplr(x);

n=-fliplr(n);

function [y,n] = sigshift(x,m,n0)

n = m+n0;

y=x;

function [y,n] = sigmult(x1,n1,x2,n2)

n = min( min(n1), min(n2) ) : max( max(n1), max(n2) );

y1 = zeros( 1, length(n) ); y2=y1;

y1( find( ( n >= min( n1 ) ) & ( n <= max( n1 ) ) == 1 ) ) = x1;

y2( find( ( n >= min( n2 ) ) & ( n <= max( n2 ) ) == 1 ) ) = x2;

y = y1 .\* y2;

**2.convolution.m文件—计算卷积与互相关**

close all;clc;clear;

%定义x(n)与h(n)，以及下标

x=[3,7,5,-1,2];

nx=-3:1;

h=[4,-1,2,3];

nh=0:3;

%计算卷积y(n)=x(n)\*h(n)

[y, ny]=convOperation(x, nx, h, nh);

isequal(y,conv(x,h))

%计算互相关y1(n)=x(n)\*h(-n)

h=fliplr(h);

nh=-fliplr(nh);

[y1, ny1]=convOperation(x, nx, h, nh);

%绘制图像

subplot(4,1,1);stem(nx,x);title('x(n)');

subplot(4,1,2);stem(nh,h);title('h(n)');

subplot(4,1,3);stem(ny, y);title('卷积y1(n)');

subplot(4,1,4);stem(ny1, y1);title('互相关y2(n)');

**3.结果**

x=[3,7,5,-1,2]; h=[4,-1,2,3];

卷积结果：y(n)= x(n)\*h(n)=[ 12 25 19 14 40 11 1 6]

互相关结果：y1(n)=x(n)\*h(-n)=[ 9 27 26 12 27 25 -6 8]

注：下划线处下标为0

图形如下图所示：

