 

**数字信号处理**

**实 验 报 告**

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| **课程名称：** | **数字信号处理实验** |
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| **学生专业：** | **信息工程** |
| **开课学期：** | **2016年~2017年第二学期** |
| **实验成绩：** |  |

**电子信息学院**

**2017年4月**

**第一部分 阅读程序**

**Program 2\_1**

相关matlab函数与语法：

rand是平均分布，即等概率分布。

rand是标准正态分布，均值为0，标准差为1。

d’是d的转置。

程序目的和作用：

减小随机噪声对原始信号的干扰。

程序实现思路：

呈现原始信号图像1。

用rand()函数产生随机信号，呈现图像2。

将随机信号叠加到原始信号上，呈现图像3。

多次叠加随机信号和原始信号并求平均值，呈现图像4。

发现图像1和图像4非常相似，经处理后的信号非常平滑。说明可通过此方法减小随机噪声对原始信号的干扰。

修改程序如下：

% Program 2\_1

% Generation of the ensemble average

%

R = 50;

m = 0:R-1;

s = 2\*m.\*(0.9.^m); % Generate the uncorrupted signal

d = rand(R,1)-0.5; % Generate the random noise

x1 = s+d';

subplot(4,1,1);stem(m,s);

xlabel('Time index n');ylabel('Amplitude'); title('Singal');

subplot(4,1,2);stem(m,d);

xlabel('Time index n');ylabel('Amplitude'); title('Noise');

subplot(4,1,3);stem(m,x1);

xlabel('Time index n');ylabel('Amplitude'); title('Corrupted singal');

for n = 1:50;

d = rand(R,1)-0.5;

x = s + d';

x1 = x1 + x;

end

x1 = x1/50;

subplot(4,1,4);stem(m,x1);

xlabel('Time index n');ylabel('Amplitude'); title('Ensemble average');



**Program 2\_2**

相关matlab函数与语法：利用conv函数求卷积。Lenth() 函数求c的长度。

程序目的和作用：输入两个序列a和b，得到它们的卷积c序列并呈现出来。

>> Program\_2\_2

Type in the first sequence = [1, 9 ,9 ,6, 1, 2, 2, 6]

Type in the second sequence = [2, 0, 1, 4, 3, 0, 2, 5, 0, 0, 6, 9]

output sequence =

Columns 1 through 9

2 18 19 25 50 73 58 59 76

Columns 10 through 18

77 68 90 149 139 90 21 30 54

Column 19

54



**Program 2\_3**

相关matlab函数与语法：

real(x):x的实部。

imag(x):x的虚部。

程序的目的和作用：

输入复指数的实部、虚部；振幅；序列的长度。输出复指数序列的实部和虚部的图。

Type in real exponent = 1/6

Type in imaginary exponent = pi/4

Type in the gain constant = 3

Type in length of sequence = 100

PRESS RETURN for imaginary part

>>





**Program 2\_4**

相关matlab函数与语法：

num2str(a):把数组a中的数转换成字符串表现形式。

程序目的与作用：

输入a, K, N, 输出以a为底，K为常系数，n为指数的指数序列。

>> Program\_2\_4

Type in argument = 2

Type in the gain constant = 6

Type in length of sequence = 10

>>



**Program 2\_5**

相关matlab函数与语法：

Fliplr(a)：实现矩阵的翻转。

程序目的与作用：利用r = conv(x,fliplr(y));求x与y的互相关序列。

Type in the reference sequence = [5, 6, 7, 8, 9]

Type in the second sequence = [1, 2, 3 ,4, 5, 6]

>> 

**Program 2\_6**

相关matlab函数与语法：

k=-28:28; stem(k,r(68:124));从此句可习得如何限定在某一x范围内显示序列。

程序的目的与作用：

序列x是正弦序列，y是x序列上叠加随机噪声。求y的自相关函数。

将之与x的自相关函数对比，可知其虽然形状相似，且都在0点处取得最大值。





**第二部分 修改程序**

**题2.1 求共轭对称序列和共轭反对称序列**

**相关matlab语法与函数：**

floor()：向下取整

**重要公式：**

xcs=0.5\*(x+conj(fliplr(x)));

xca=0.5\*(x-conj(fliplr(x)));

**修改源程序如下：**

clc;

clear;

a=input('Type in real part =');

b=input('Type in imaginary part =');

n1=length(a)/2;

n2=floor(n1);向下取整

n=(-n2):(n2);

x=a+b\*1i;

xcs=0.5\*(x+conj(fliplr(x)));%conjugate symmetric part of sequence

xca=0.5\*(x-conj(fliplr(x)));%conjugate antisymmetric part of sequence

disp(xcs);

disp(xca);

figure,

subplot(4,1,1);

stem(n,xcs);

xlabel('n');ylabel('xca[n]');

title('xca[n]:the conjugate symmetric part of sequence x[n]');

subplot(4,1,2);

stem(n,xca);

xlabel('n');ylabel('xcs[n]');

title('xcs[n]:the conjugate antisymmetric part of sequence x[n]');

subplot(4,1,3);

x1=xcs+xca;

stem(n,x1);

xlabel('n');ylabel('xcs[n]+xca[n]');

title('xcs[n]+xca[n]');

subplot(4,1,4);

stem(n,x);

xlabel('n');ylabel('x[n]');

title('x[n]');

**实验过程：**

Type in real part =[0 1 -2 4 -5 0 3]

Type in imaginary part =[0 4 3 -2 -6 -2 0]

**实验结果：**

**Columns 1 through 3**

**1.5000 0.5000 + 3.0000i -3.5000 + 4.5000i**

**Columns 4 through 6**

**4.0000 -3.5000 - 4.5000i 0.5000 - 3.0000i**

**Column 7**

**1.5000**

**Columns 1 through 3**

**-1.5000 0.5000 + 1.0000i 1.5000 - 1.5000i**

**Columns 4 through 6**

**0 - 2.0000i -1.5000 - 1.5000i -0.5000 + 1.0000i**

**Column 7**

**1.5000 **

**结果分析：** 实验结果与课本相同；x[n]与xcs[n]+xca[n]的图像相同。证明任何复序列x[n]都可以表示成其共轭对称部分xcs[n]与其共轭反对称部分xca[n]的和。

且xcs=0.5\*(x+conj(fliplr(x)));xca=0.5\*(x-conj(fliplr(x)));

**题2.2 生成序列**

1. **源码：**

a=input('Type in real part =');

b=input('Type in imaginary part =');

c=a+b\*1i;

K1=1;

N=40;

n=1:N;

x\_a1=K1\*exp(c\*n);

figure,

subplot(2,1,1);

%the real part of x\_a1[n]

stem(n,real(x\_a1));

xlabel('n');ylabel('real(x\_a1)');

title('picture2.23(a):real part of sequence x\_a1[n]');

subplot(2,1,2);

%the imaginary part of x\_a1[n]

stem(n,imag(x\_a1));

xlabel('n');ylabel('imag(x\_a1)');

title('picture2.23(b):imaginary part of sequence x\_a1[n]');

**实验过程：**

Type in real part =-1/12

Type in imaginary part =pi/6

>>

**实验结果：**



**结果分析：**

2.23：因为n>0, 此复指数序列的实部和虚部都是具有递减振幅的实正弦序列。

2.24：若A和a都是实数，此序列可简化为实指数序列。N>=0时，α=1.2时序列随n的增加而呈指数增加。α=0.9时，序列随n的增加而减小。

**2.24源码：**

%Matlab Exercises M2.2

clc;

clear;

%Figure 2.24(a)

%when:alpha\_a=1.2 K2\_a=0.2

%output:sequence x\_a2\_a[n]

alpha\_a=input('Type in real part =');

K2\_a=input('Type in the gain constant =');

x\_a2\_a=K2\_a\*alpha\_a.^n;

figure,

subplot(2,1,1);

stem(n,x\_a2\_a);

xlabel('n');ylabel('x\_a2\_a');

title('picture 2.24(a):sequence x\_a2\_a[n]');

% Figure 2.24(b)

%when:alpha\_b=0.9 K2\_b=20

%output:sequence x\_a2\_b[n]

alpha\_b=input('Type in real part =');

K2\_b=input('Type in the gain constant =');

x\_a2\_b=K2\_b\*alpha\_b.^n;

subplot(2,1,2);

stem(n,x\_a2\_b);

xlabel('n');ylabel('x\_a2\_b');

title('picture 2.24(b):sequence x\_a2\_b[n]');

**实验过程：**

Type in real part =1.2

Type in the gain constant =0.2

Type in real part =0.9

Type in the gain constant =20

**>>**

**实验结果：**



1. **源码同图2.23的源码**

%Question(b)----------------------------

%when:K\_b=-2.7 a\_b=-0.4 b\_b=pi/6 N\_b=82

%output:sequence x\_b[n]

K1=input('Type in gain constant =');

a=input('Type in real part =');

b=input('Type in imaginary part =');

c=a+b\*1i;

N=82;

n=1:N;

x\_b=K1\*exp(c\*n);

stem(n,x\_b);

xlabel('n');ylabel('x');

title('sequence x[n]');

**实验过程：**

M2\_2

Type in gain constant =-2.7

Type in real part =-0.4

Type in imaginary part =pi/6

**实验结果图**



**题2.3 生成周期序列**clc;

clear;

%when the length of sequence N=100

N=100;

n=0:100;

%Creat the periodic sequence xb[n]

xb=cos(0.6\*pi\*n+0.3\*pi);

figure;

stem(n,xb);grid;

xlabel('n');ylabel('xb[n]');

title('the periodic sequence xb[n]');

%Creat the periodic sequence xc[n]

xc=real(exp(pi\*1i\*n/8))+imag(exp(pi\*1i\*n/5));

figure;

stem(n,xc);grid;

xlabel('n');ylabel('xc[n]');

title('the periodic sequence xc[n]');

%Creat the periodic sequence xd[n]

xd=6\*sin(0.15\*pi\*n)-cos(0.12\*pi\*n+0.1\*pi);

figure;

stem(n,xd);grid;

xlabel('n');ylabel('xd[n]');

title('the periodic sequence xd[n]');

%Creat the periodic sequence xe[n]

xe=sin(0.1\*pi\*n+0.75\*pi)-3\*cos(0.8\*pi\*n+0.2\*pi)+cos(1.3\*pi\*n);

figure;

stem(n,xe);grid;

xlabel('n');ylabel('xe[n]');

title('the periodic sequence xe[n]');

**图：**



(b)周期为10



(c)周期为20



(d)周期为200



(e)周期为20

**题2.4**

A=input('Type in amplitude of sequence=');

L=input('Type in length of sequence=');

omega=input('Type in angular frequency of sequence=');

phi=input('Type in phase of sequence=');

n=0:L;

x=A\*cos(omega\*n+phi);

stem(n,x);

xlabel('n');ylabel('x[n]');

title('sequence x[n]');



由图知周期为20。

**题2.5 验证连续时间信号的离散时间表示的不确定性**

clc;

clear;

%% ouput:gx(t)-the cosine funtion

% gx\_TS(t)-when gx(t) sampled in Ts=0.1s

t=0:0.001:1;

g1=cos(6\*pi\*t);

subplot(3,1,1);

plot(t,g1,'r');

hold on;

%sampling

Ts=0.1;%sampling frequency

t1=0:Ts:1;

g1\_Ts=cos(6\*pi\*t1);

stem(t1,g1\_Ts,'b');

xlabel('t');ylabel('Amplitude');

title('when the frequency=3Hz:red for g1(t) and blue for g1(t) sampled in 0.1s');

hold off;

g2=cos(14\*pi\*t);

subplot(3,1,2);

plot(t,g2,'r');

hold on;

g2\_Ts=cos(14\*pi\*t1);

stem(t1,g2\_Ts,'b');

xlabel('t');ylabel('Amplitude');

title('when the frequency=7Hz:red for g2(t) and blue for g2(t) sampled in 0.1s');

hold off;

g3=cos(26\*pi\*t);

subplot(3,1,3);

plot(t,g3,'r');

hold on;

g3\_Ts=cos(26\*pi\*t1);

stem(t1,g3\_Ts,'b');

xlabel('t');ylabel('Amplitude');

title('when the frequency=14Hz:red for g3(t) and blue for g3(t) sampled in 0.1s');

hold off;



此图中有三个不同频率的连续时间余弦函数，但用同样的采样频率（10HZ）采样，由图可知，采样得到的序列相同。即：用离散时间表示连续时间信号有不确定性。

**题2.6 画出连续时间信号及其抽样形式**

A=input('Type in amplitude of seque1nce=');

phi=input('Type in phase of sequence=');

T=input('Type in length of sequence=');

Ts=input('Type in sampling frequency=');

omega=input('Type in angular frequency vector of sequence=');%omega vector

t=0:0.001:T;

for i=1:length(omega)

x=A\*cos(omega(i)\*t+phi);

plot(t,x,'r');

hold on;

t1=0:Ts:T;

x\_Ts=A\*cos(omega(i)\*t1+phi);

stem(t1,x\_Ts,'b');

xlabel('n');ylabel('amplitude');

title('red for cosine sequence x[n] and blue for sampling sequence x\_Ts[n]');

end

Type in amplitude of seque1nce=1

Type in phase of sequence=0

Type in length of sequence=1

Type in sampling frequency=0.1

Type in angular frequency vector of sequence=6\*pi



**题2.7 求自相关序列和互相关序列**

clc;

clear;

%given sequence x[n] y[n] w[n]

%output:autocorrelation sequence rxx[l] ryy[l] rww[l]

% correlation sequence rxy[l] rxw[l]

x=[2 0 -1 6 -3 2 0];

y=[8 2 -7 -3 0 1 1];

w=[3 6 -1 2 6 6 1];

%for the autocorrelation sequence-----------------

rxx=conv(x,fliplr(x));

nxx=-6:6;%when nx ranges from -3 to 3

ryy=conv(y,fliplr(y));

nyy=-10:2;%when ny ranges from -5 to 1

rww=conv(w,fliplr(w));

nww=-4:8;%when nw ranges from -2 to 4

figure,

subplot(3,1,1);

stem(nxx,rxx);

xlabel('l');ylabel('amplitude');

title('rxx[l]');

subplot(3,1,2);

stem(nyy,ryy);

xlabel('l');ylabel('amplitude');

title('ryy[l]');

subplot(3,1,3);

stem(nww,rww);

xlabel('l');ylabel('amplitude');

title('rww[l]');

%for the correlation sequence---------------------

rxy=conv(x,fliplr(y));

nxy=-8:4;%when nx ranges from -3 to 3 and ny ranges from -5 to 1

rxw=conv(x,fliplr(w));

nxw=-5:7;%when nx ranges from -3 to 3 and nw ranges from -2 to 4

figure,

subplot(2,1,1);

stem(nxy,rxy);

xlabel('l');ylabel('amplitude');

title('rxy[l]');

subplot(2,1,2);

stem(nyy,ryy);

xlabel('l');ylabel('amplitude');

title('rxw[l]');





**题2.8 输入序列求自相关和互相关序列**

x=input('Type in sequence x[n]=');

x\_index=[-3:3];

y=input('Type in sequence y[n]=');

y\_index=[-5:1];

w=input('Type in sequence w[n]=');

w\_index=[-2:4];

subplot(5,1,1);

rxx=conv(x,fliplr(x));%autocorrelation sequence

rxx\_index=[min(x\_index)-max(x\_index):max(x\_index)-min(x\_index)];

ryy=conv(x,fliplr(x));%autocorrelation sequence

ryy\_index=[min(y\_index)-max(y\_index):max(y\_index)-min(y\_index)];

rww=conv(x,fliplr(x));%autocorrelation sequence

rww\_index=[min(w\_index)-max(w\_index):max(w\_index)-min(w\_index)];

rxy=conv(x,fliplr(y));%autocorrelation sequence

rxy\_index=[min(x\_index)-max(y\_index):max(x\_index)-min(y\_index)];

rxw=conv(x,fliplr(w));%autocorrelation sequence

rxw\_index=[min(x\_index)-max(w\_index):max(x\_index)-min(w\_index)];

subplot(5,1,1);

stem(rxx\_index,rxx);

xlabel('l');ylabel('amplitude');

title('rxx[l]');

subplot(5,1,2);

stem(ryy\_index,ryy);

xlabel('l');ylabel('amplitude');

title('ryy[l]');

subplot(5,1,3);

stem(rww\_index,rww);

xlabel('l');ylabel('amplitude');

title('rww[l]');

subplot(5,1,4);

stem(rxy\_index,rxy);

xlabel('l');ylabel('amplitude');

title('rxy[l]');

subplot(5,1,5);

stem(rxw\_index,rxw);

xlabel('l');ylabel('amplitude');

title('rxw[l]');

Type in sequence x[n]=[2 0 -1 6 -3 2 0]

Type in sequence y[n]=[8 2 -7 -3 0 1 1]

Type in sequence w[n]=[3 6 -1 2 6 6 1]

>>



**题2.9**

%Type in sequence x[n]=[2 0 -1 6 -3 2 0]

x=input('Type in sequence x[n]=');

N=size(x);

d=rand(N);%creat a random noise d[n]

xd=x+d;%additive random noise

subplot(2,1,1);

stem(xd);

xlabel('n');ylabel('amplitude');

title('x\_d[n]');

rxxd=conv(xd,fliplr(xd));%autocorrelation sequence

subplot(2,1,2);

stem(rxxd);

xlabel('l');ylabel('amplitude');

title('xxxd[l]');



**题2.10 求因果指数衰减序列的自相关序列**

%Homework M2\_10

%Coded by ChenChongyan class3,SCUT-EE

%No.201430250069

clc;

clear;

%given attenuation index alpha\_a=0.6 alpha\_b=0.8

%x[n]=(alpha.^n).\*u[n]

%output:two autocorrelation sequence rxxa[l] rxxb[l]

a=input('a=');

%when x[n] is a casual sequence

n=0:20;%interception part of the unlimited sequence

fn=heaviside(n);

xa=a.^n.\*fn;

y=conv(xa,fliplr(xa));

stem(y);

xlabel('l');ylabel('amplitude');

title('x=alpha^n\*u[n]');

a=0.6



a=0.8



**第三部分 编写程序**

**Program 3\_1**

**题目：**

**绘出信号x[n]=，当Z=(1/12)+j、Z= -(1/12)+j时、Z=(1/12)、 Z=2+j时的信号实部和虚部图；当时Z=j呢？此时信号周期为多少？**

**实现方法一：**

**程序：**

clc;

clear;

z1=(1/12)+j\*pi/6;

z2=-(1/12)+j\*pi/6;

z3=1/12

z4=2+j\*pi/6;

z5=j\*pi/6;

n=0:100;

x1=exp(z1.\*n);

x2=exp(z2.\*n);

x3=exp(z3.\*n);

x4=exp(z4.\*n);

x5=exp(z5.\*n);

y11=real(x1);y12=imag(x1);

y21=real(x2);y22=imag(x2);

y31=real(x3);y32=imag(x3);

y41=real(x4);y42=imag(x4);

y51=real(x5);y52=imag(x5);

subplot(5,2,1);stem(n,y11,'r','.');grid;

xlabel('n');ylabel('real(x1)');

title('x1=e^(z1\*n);z1=(1/12)+j\*pi/6');

subplot(5,2,2);stem(n,y12,'b','.');grid;

xlabel('n');ylabel('imag(x1)');

title('x1=e^(z1\*n);z1=(1/12)+j\*pi/6');

subplot(5,2,3);stem(n,y21,'r','.');grid;

xlabel('n');ylabel('real(x2)');

title('x2=e^(z1\*n);z2=-(1/12)+j\*pi/6');

subplot(5,2,4);stem(n,y22,'b','.');grid;

xlabel('n');ylabel('imag(x2)');

title('x2=e^(z1\*n);z2=-(1/12)+j\*pi/6');

subplot(5,2,5);stem(n,y31,'r','.');grid;

xlabel('n');ylabel('real(x3)');

title('x3=e^(z1\*n);z3=1/12');

subplot(5,2,6);stem(n,y32,'b','.');grid;

xlabel('n');ylabel('imag(x3)');

title('x3=e^(z1\*n);z3=1/12');

subplot(5,2,7);stem(n,y41,'r','.');grid;

xlabel('n');ylabel('real(x4)');

title('x4=e^(z1\*n);z4=2+j\*pi/6');

subplot(5,2,8);stem(n,y42,'b','.');grid;

xlabel('n');ylabel('imag(x4)');

title('x4=e^(z1\*n);z4=2+j\*pi/6');

subplot(5,2,9);stem(n,y51,'r','.');grid;

xlabel('n');ylabel('real(x5)');

title('x5=e^(z5\*n);z5=j\*pi/6');

subplot(5,2,10);stem(n,y52,'b','.');grid;

xlabel('n');ylabel('imag(x5)');

title('x5=e^(z5\*n);z5=j\*pi/6');

figure,

stem(n,x5);

xlabel('n');ylabel('x5');

title('x5=e^(z1\*n);z5=j\*pi/6');

**图：**

**实现方法二：**

**程序：**

n=-30:30;

a=input('输入Z的实部a=');

b=input('输入Z的虚部b=');

Z=a+j\*b;

X=exp(Z.\*n);

subplot(2,1,1);

stem(n,imag(X));

xlabel('n');ylabel('Amplitude');

title('x的实部')

subplot(2,1,2);;

stem(n,real(X));

xlabel('n');ylabel('Amplitude');

title('x的虚部');

**过程：**

输入Z的实部a=1/12

输入Z的虚部b=pi/6

er

输入Z的实部a=-1/12

输入Z的虚部b=pi/6

er

输入Z的实部a=1/12

输入Z的虚部b=0

>> er

输入Z的实部a=2

输入Z的虚部b=pi/6

>>

>> er

输入Z的实部a=0

输入Z的虚部b=pi/6

>>

**图：**



Z=(1/12)+j



Z= -(1/12)+j



Z=(1/12)



Z=2+j



Z=j

由图可知，Z=j\*pi/6时，信号周期是12。

**Program 3\_2**

**题目：**

**2、信号x(t)=1.5sin(2π\*20t)，对其进行采样，采样频率为800hz。**

**1）试画出采样后的信号x[n],采样后信号的频率是多少？周期是多少？**

**2）产生一个数字频率为0.9的正弦序列，并显示该信号，说明其周期。**

1. **知识点：**

clc;

clear;

t=0:0.000001:0.1;

x=1.5\*sin(2\*pi\*20\*t);

plot(t,x,'r');

hold on;

Ts=1/800;

t1=0:Ts:0.1;

x\_Ts=1.5\*sin(2\*pi\*20\*t1)

stem(t1,x\_Ts,'g');

xlabel('t');ylabel('Amplitude');

title('红色是x(t)=1.5sin(2\*pi\*20\*t，绿色对其采样后的信号（采样频率为800hz）');

hold off;

**1）图**



**2）程序**

clc;

clear;

w=2\*pi\*0.9;

n=1:100;

x=sin(w.\*n);

stem(n,x);grid;

xlabel('n');ylabel('Amplitude');

title('数字频率为0.9的正弦序列');

**2）图**



**2）结果分析：**

信号x(t)采样后的数字角频率w0=20\*2\*pi/800=0.05pi，周期是1/(w0/2/pi)=40；

数字频率为0.9的正弦序列的周期为0.23pi。

**Program 3\_3**

**题目：**

**绘出下面5种信号的波形**

**单位冲激信号，单位阶跃信号，实指数信号，复指数信号，正弦信号**

**程序：**

**1)单位冲激信号**

n=-10:10;

x1=[n==0];

subplot(1,2,1);

stem(n,x1,'filled');

N1=input('单位冲激函数的位移值为N1=');

x2=[(n-N1)==0];

subplot(1,2,2);

stem(n,x2,'filled');



2）单位阶跃信号

a)离散单位阶跃信号

clear all;

clc;

n=-5:25;

N1=input('偏移值N1=')

fn=heaviside(n-N1);

plot(n,fn,'.r','Markersize',15);

xlabel('t');ylabel('Amplitude');

title('单位冲激信号');

grid on;



b)连续阶跃函数波形

t0=input('偏移值t0=');

t=-0.5:0.001:2\*t0;

u=stepfun(t,t0);

plot(t,u);grid;

axis([-0.5 2\*t0 -0.2 1.2])

xlabel('t');ylabel('Amplitude');

title('单位阶跃信号');



3）实指数信号

clear all;

clc;

t=0:0.1:1;

a=input('a=');

x=exp(a\*t);

plot(t,x);grid;

xlabel('t');ylabel('Amplitude');

title('实指数信号');



4）复指数信号

(a=1;b=pi/6)

n=-30:30;

a=input('输入Z的实部a=');

b=input('输入Z的虚部b=');

Z=a+j\*b;

X=exp(Z.\*n);

subplot(2,1,1);

stem(n,imag(X));

xlabel('n');ylabel('Amplitude');

title('x的实部')

subplot(2,1,2);;

stem(n,real(X));

xlabel('n');ylabel('Amplitude');

title('x的虚部');



5）正弦信号

clear all;

clc;

w=input('w=');

A=input('A=');

t=0:0.001:2\*pi;

x=A\*sin(2\*pi\*w\*t);

plot(t,x,'r');

xlabel('t');ylabel('Amplitude');

title(‘正弦信号');

