云南大学资源环境与地球科学学院

《地震数字信号处理》课程实验报告

实验序号 08 实验名称 序列的圆周运算 指导教师 杨海燕老师

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请实验指导教师根据实验情况，自行选择以下内容进行填写并留适当空白	成绩
♦ 实验目的（必填） 熟悉序列的圆周运算 ♦ 实验原理（请用自己的语言简明扼要地叙述） 利用线性卷积与圆周卷积运算之间的关系可简便计算出圆周卷积 ♦ 实验内容与数据来源（简明写出实验方法、关键步骤和要测量的参数） **1，x(n)={1,0,2,1,3},n 属于 0~4,求 x(n)和自己的卷积，N=5 的与自己的圆周卷积；N=10，与自己的圆周卷积。** **2，x(n)={1,2,4,3,0,5},n 属于 0~5，求 x(n)的 DFT，即 X(k)。** ♦ 程序代码（必填） 第一题 **fortran：** program ex08 ♦ integer,dimension(5)::a=(/1,0,2,1,3/) ♦ integer,dimension(9)::b=0 ♦ integer,dimension(10)::c=0 ♦ integer::i=1,j=1	

```
      do i=1,5
      do j=1,5
      b(i+j-1)=b(i+j-1)+a(i)*a(j)
      enddo
      enddo

      open(1,file='X.data',status='replace')
      do i=0,4
      write(1,'(3I3)') i,a(i+1),a(i+1)
      enddo
      close(1)

      a=0
      do i=0,8
      a(modulo(i,5)+1)=a(modulo(i,5)+1)+b(i+1)
      enddo

      open(1,file='XX.data',status='replace')
      do i=1,9
      write(1,'(3I3)') i-1,b(i),b(i)
      enddo
      close(1)


      open(1,file='XX5.data',status='replace')
      do i=1,5
      write(1,'(3I3)') i-1,a(i),a(i)
      enddo
      close(1)

      do i=0,8
      c(modulo(i,10)+1)=c(modulo(i,10)+1)+b(i+1)
      enddo

      open(1,file='XX10.data',status='replace')
      do i=1,10
      write(1,'(3I3)') i-1,c(i),c(i)
      enddo
      close(1)
      end program ex08
```

GMT:

```
#!/usr/bin/env -S bash -e
```

- # GMT modern mode bash template
- # Date: 2022-05-17T16:39:58
- # User: sirius
- # Purpose: Purpose of this script
- export GMT_SESSION_NAME=$$ # Set a unique session name
- gmt begin T1 png/pdf
- # Place modern session commands here
- #gmt set FONT_LABEL 12p,ZapfDingbats
- gmt subplot begin 4x1 -Ff30c/50c
- gmt subplot set 0
- gmt plot -Sb0.1cb0 -JX25c/10c -R0/11/0/15 X.data -Gblack -BWS -Bx+l'n' -By+l'X(n)'
- gmt plot -Sc0.3c -JX25c/10c X.data -Gblack
- gmt text -JX25c/10c -D1/1 -F+f30p X.data
- gmt subplot set 1
- gmt plot -Sb0.1cb0 -JX25c/10c -R0/11/0/15 XX.data -Gblack -BWS -Bx+l'n' -By+l'X(n)*X(n)'
- gmt plot -Sc0.3c -JX25c/10c XX.data -Gblack
- gmt text -JX25c/10c -D1/1 -F+f30p XX.data
- gmt subplot set 2
- gmt plot -Sb0.1cb0 -JX25c/10c -R0/11/0/15 XX5.data -Gblack -BWS -Bx+l'n' -By+l'X(n) X(n)'
- gmt basemap -JX25c/10c -R0/11/0/15 -BWS -By+l'\260' --FONT_LABEL=ZapfDingbats
- gmt plot -Sc0.3c -JX25c/10c XX5.data -Gblack
- gmt text -JX25c/10c -D1/1 -F+f30p XX5.data
- gmt subplot set 3
- gmt plot -Sb0.1cb0 -JX25c/10c -R0/11/0/15 XX10.data -Gblack -BWS -Bx+l'n' -By+l'X(n) X(n)'
- gmt basemap -JX25c/10c -R0/11/0/15 -BWS -By+l'\265' --FONT_LABEL=ZapfDingbats
- gmt plot -Sc0.3c -JX25c/10c XX10.data -Gblack
- gmt text -JX25c/10c -D1/1 -F+f30p XX10.data
- gmt subplot end
- gmt end show

第二题：

fotran：

program ex09

- complex(kind=4)::a
- integer,dimension(6)::x=(/1,2,4,3,0,5/)
- complex,dimension(6)::Xa=(0,0)

```
      real::PI=3.14159,k
      integer::i,j
      do i=0,5
      do j=0,5
      Xa(i+1)=Xa(i+1)+x(j+1)*complex(cos(2*PI/6*i*j),-sin(2*PI/6*i*j))
      enddo
      enddo
      a=complex(10,1*10)
      write(*,'(f8.3,f8.3)') real(a),aimag(a)
      open(1,file='X2.data',status='replace')
      do i=1,6
      k=sqrt(real(Xa(i))**2+aimag(Xa(i))**2)
      write(1,'(i3,f8.3,f8.3)') i-1,k,k
      enddo
      close(1)
      open(1,file='X22.data',status='replace')
      do i=1,6
      write(1,'(3i3)') i-1,x(i),x(i)
      enddo
      close(1)
      end program ex09
```

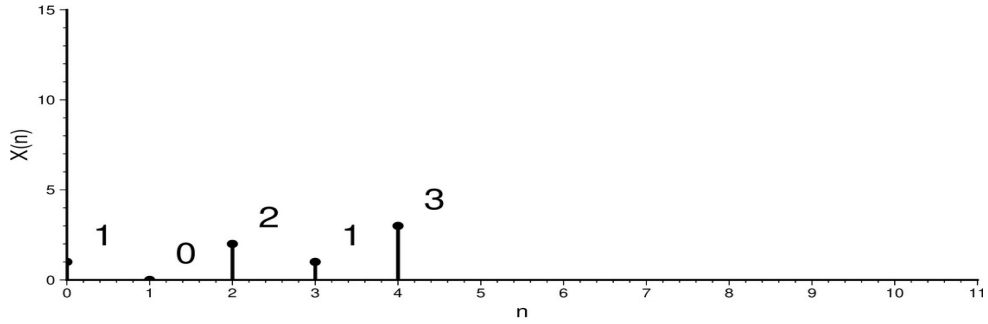
GMT:

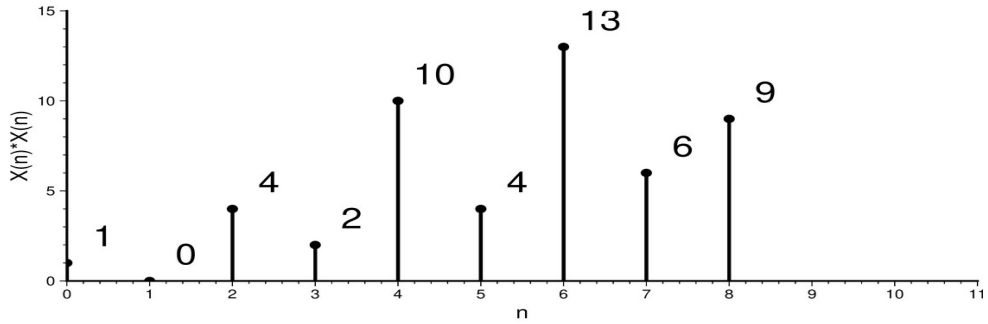
```
#!/usr/bin/env -S bash -e
# GMT modern mode bash template
# Date:    2022-05-19T23:12:38
# User:    sirius
# Purpose: Purpose of this script
export GMT_SESSION_NAME=$$  # Set a unique session name
gmt begin T82 png/pdf
# Place modern session commands here
gmt subplot begin 2x1 -Ff30c/25c
gmt subplot set 0
#gmt text -R-1/6/0/18 -D1/0.1 X22.data
gmt plot -Sb0.1cb0 -R-1/6/0/18 -JX30c/10c X22.data -Gblack -BWS -Bx+l'n' -By+l'x(n)'
gmt plot -Sc0.2c -JX30c/10c X22.data -Gblack
gmt text -D0.5/0.5 X22.data -F+f20p
gmt subplot set 1
#gmt text -R-1/6/0/18 -JX30c/10c -D1/1 X2.data -F+f20p
gmt plot -Sb0.1cb0 -R-1/6/0/18 -JX30c/10c X2.data -Gblack -BWS -Bx+l'k' -By+l'X(k)'
gmt plot -Sc0.2c  -JX30c/10c X2.data -Gblack
```

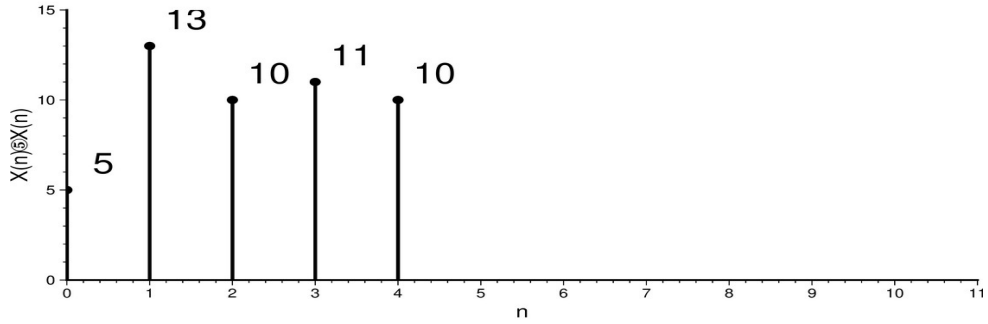
- gmt text -JX30c/10c -D0.5/0.5 X2.data -F+f20p
- gmt subplot end
- gmt end show

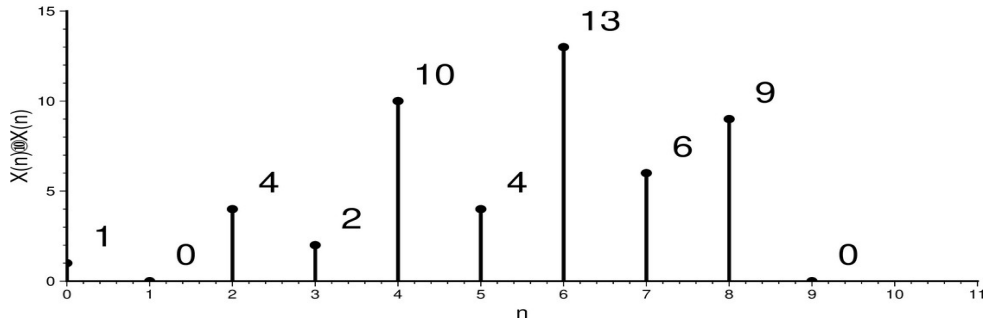
- **实验结论（必填）**

第一题：

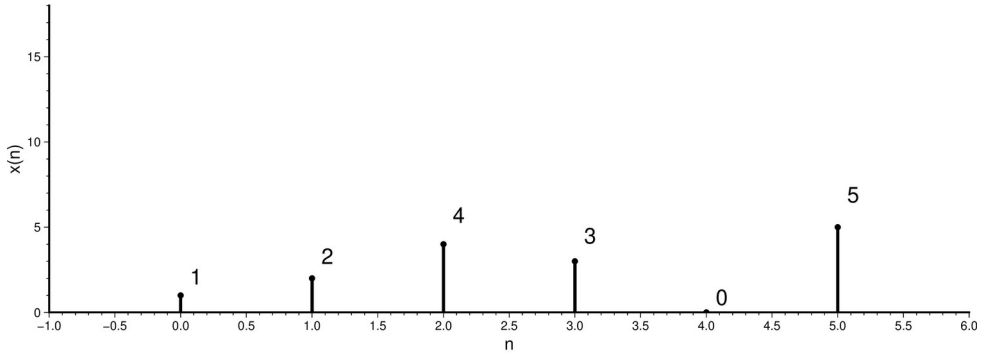


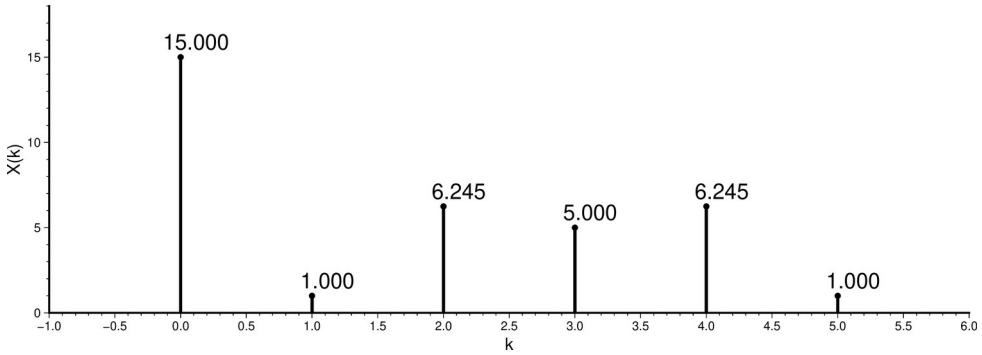






第二题：





- **实验体会及建议、思考**

利用圆周卷积和线性卷积之间的联系可以较为简便地计算圆周卷积。