Subject: Complications with variance using FFTs
Posted by olde_english33 on Fri, 16 Jul 2004 18:08:30 GMT
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First I computed the FFT of a recorded time series. I then computed the spectrum of this time series to keep the amplitudes of the original data. I then wanted to tie in a random phase because I want to give variables the same kind of shape when I inverse transform. Here is a sample of my code:

```
for i=0,12 do begin
  Xf1[*,i]=fft(xf1[*,i])*31.0
  Xf2[*,i]=fft(xf2[*,i])*31.0
  specx1[*,i]=Xf1[*,i]*conj(Xf1[*,i])/31.0
  specx2[*,i]=Xf2[*,i]*conj(Xf2[*,i])/31.0
endfor

for i=0,30 do begin
  avgspec1=mean(spec1[i,*])
  avgspec2=mean(spec2[i,*])
endfor

for j=0,99 do begin
  ggg=randomu(5*j*!PI,15)
  hhh[0]=0.0
  hhh[1:15]=ggg
  for k=0,14 do begin
    hhh[30-k]=ggg[k]
  endfor
  aaa[*,j]=(randomu(2*j+3,31)-0.5)*sqrt(12.0)
  bbb[*,j]=fft(aaa[*,j])
  ccc1[*,j]=bbb[*,j]*exp(2.0*!PI*hhh*imag)
  ccc2[*,j]=bbb[*,j]*exp(2.0*!PI*hhh*imag)
  ddd1[*,j]=(fft(ccc1[*,j],1))
  ddd2[*,j]=(fft(ccc2[*,j],1))
endfor
```

My dilemma is that the average sample variances of the generated time series ddd1 and ddd2 are nowhere close to the average sample variance of the orginal time series xf1 and xf2. A colleague and I have narrowed it down to the fact that we are multiplying the spectrum by a random phase which is throwing off the variance but I don't know how to counteract this problem. Can anyone help???