Subject: Re: FFT confusion
Posted by kapoorconsciousness on Sat, 05 Aug 2017 22:59:20 GMT
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Solved, you we missing taking into account the deltat of your data into making the chirp signal. The code below would work:

```
 time = (2.0/1000)*findgen(1001)        ; time (s). NB 1001 samples in 2s
 ; so sampling freq is 500 Hz thus
 ; Nyquist freq is 250 Hz

 ;;; so your deltat = 2, aha!
 deltat = 2;

 freq = 100.0 + (50.0/1000)*findgen(1001)/deltat ; chirp frequency array

 theta = 2*!pi*freq*time ; chirp phase angle

 i = complex(0,1)

 signal = exp(i*theta)

 neg_freq_axis = reverse(-((250.0/500)*findgen(501)))
 pos_freq_axis = ((250.0/499)*findgen(500)) + 1.0
 freq_axis = [neg_freq_axis,pos_freq_axis]        ; x-axis for plot

 window,2,xsize=500,ysize=250
 plot,freq_axis,alog10(shift(((abs(fft(signal)))^2),500)),$
   xrange=[0,260],$
   /xstyle,$
   xticklen=1,$
   xgridstyle=1,$
   yticklen=1,$
   ygridstyle=1

set_plot, "x";
end
```

On Monday, May 19, 2003 at 5:46:19 PM UTC+2, Julian Field wrote:
> Kenneth Bowman <k-bowman@null.tamu.edu> wrote in message news:<k-bowman-FF6825.10385215052003@news.tamu.edu>...
>> In article <7126861e.0305150615.29c97045@posting.google.com>,
>> jefield@taz.qinetiq.com (Julian Field) wrote:
>>
>>> Hi,
>>>
>>> I'd be enormously grateful if anyone could help me with this.

```
>>>
>>>  I'm looking at the power spectra of "chirp" radio signals and am
>>>  having problems getting sensible plots. The following code should
>>>  generate a complex sinusoidal chirp whose frequency runs from 100 to
>>>  150 Hz and then plot its power spectrum:
>>>
>>>  However I'm getting a frequency spectrum running from 100 to *200* Hz
>>>  and I'm really confused. This problem has been bugging me for ages and
>>>  I'd be very grateful if anyone could point out my mistake(s).
>>
>>  Your signal is not a linear combination of frequencies between 100 and
>>  150 Hz.  If it were you would get something like this.
>>
>>  pro spec
>>    time = (2.0/1000)*findgen(1001)  ; time (s). NB 1001 samples in 2s
>>                       ; so sampling freq is 500 Hz thus
>>                                  ; Nyquist freq is 250 Hz
>>    i = complex(0,1)
>>
>>    freq1 = REPLICATE(100.0, 1001)          ; single frequency #1
>>    freq2 = REPLICATE(150.0, 1001)          ; single frequency #2
>>
>>    theta1 = 2*!pi*freq1*time ; chirp phase angle
>>    theta2 = 2*!pi*freq2*time ; chirp phase angle
>>    signal = exp(i*theta1) + exp(i*theta2)
>>
>>    neg_freq_axis = reverse(-((250.0/500)*findgen(501)))
>>    pos_freq_axis = ((250.0/499)*findgen(500)) + 1.0
>>    freq_axis = [neg_freq_axis,pos_freq_axis]       ; x-axis for plot
>>
>>    window,2,xsize=500,ysize=250
>>    plot,freq_axis,alog10(shift(((abs(fft(signal)))^2),500)),$
>>    xrange=[0,260],$
>>    /xstyle,$
>>    xticklen=1,$
>>    xgridstyle=1,$
>>    yticklen=1,$
>>    ygridstyle=1
>>
>>  end
>>
>>  Even in this case you do not get perfect delta-function spikes in the
>>  power spectrum due to finite signal length and sampling.
>>
>>  To construct your frequency-swept chirp, you have to use frequencies
>>  over a larger range than the "pure" frequencies contained in your signal.
>>
>>  Ken Bowman
```

>
> Thank you very much for your help.
>
> Best wishes,
>
> Julian
