Subject: Re: Convolution of Stick Spectra
Posted by mole6e23 on Sun, 17 Sep 2000 07:00:00 GMT
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craigmnet@cow.physics.wisc.edu wrote:

> After looking at your problem it looks like the widths of the lines
> are as wide as your energy range. I guess this would be appropriate
> [snip..]
> so many exponentiations. You could have gotten a pretty big savings
> if the lines were narrow, and you could restrict the computation to a
> narrow region around the line center (say +/- 10 sigma with WHERE). I
> recommend that anyway to get rid of underflow errors.
> [snip..]
> If for example your sigma term were
> (((.12*sqrt(stick[0,i]/1000))/1.6651)*10) [note the last factor is
> smaller] then things start to look interesting.

That's because there's always a danger in taking code x and modifying it into simpler example y! As you suggested, I actually DO have a sigma term with a *10 instead of a *1000.

I did what you suggested with the +/- 10*sigma with where (code below), and it drastically improved running time. For the 5000 element array, the running time went from 62.3 seconds to 4.9 seconds! I plot the error associated with the method, and I was actually able to go down to +/- 4*sigma before there was any noticable error.

Thanks!
Todd

--

```
pro test

 convoluted = fltarr( 2, 2048 )
 convoluted[0,*] = findgen( 2048 ) / 2047. * 4.
 convoluted2 = convoluted

 ;; Let's fake a stick spectrum, we usually have at least this many elements
 stick = abs(randomn(10, 2, 5000 ))
 stick[0,*] = stick[0,*] * 4.
 stick[1,*] = stick[1,*] * 1000.

 time=systime(1)
 for i=0L, n_elements( stick ) / 2 -1 do $
     convoluted[1,*] = stick[1,i]*exp(-((convoluted[0,*] - stick[0,i])^2)/ $
               (((.12*sqrt(stick[0,i]/1000))/1.6651)*10)^2) $
```

```
                + convoluted[1,*]

 time2 = systime(1)
 for i=0L, n_elements( stick ) / 2 -1 do begin
    ;; Find range
    sigma = (((.12*sqrt(stick[0,i]/1000))/1.6651)*10)
    range = where( convoluted2[0,*] ge (stick[0,i]-4*sigma) and $
                   convoluted2[0,*] le (stick[0,i]+4*sigma) )

    if( range[0] ne -1 ) then $
      convoluted2[1,range] = stick[1,i]*exp(-((convoluted2[0,range] -  $
                          stick[0,i])^2)/sigma^2) $
                          + convoluted2[1,range]
 endfor

 print, 'time old: ', time2-time
 print, 'time new: ', systime(1)-time2

 new = convoluted
 new[1,*] = new[1,*] - convoluted2[1,*]

 plot,new[0,*], new[1,*],yrange=[-10,10]

end ;; test
```