Subject: Re: CHISQR_CVF question.
Posted by Craig Markwardt on Thu, 20 Aug 2009 08:03:27 GMT
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On Aug 19, 4:42 pm, "R.G. Stockwell" <noemai...@please.com> wrote:
> "Paolo" <pgri...@gmail.com> wrote in message
>
> basically yes, abs(fft(ts))^2, and comparing it to chisquare from the
> IDL functions.
> I have worked on it, but I think the result is off by a factor of 2.
> That is a factor of 2 too stringent.
>
...
> Perhaps you can check my understanding. If we have a 95% significance
> level,
> then if we make a spectrum with 1000 points, shouldnt 50 of them be above
> that 95% line?

Let's say we have a time series, defined like this,
LC = time series values (array)
ERR = measurement uncertainty (array) of each LC point.

I define the power spectrum in the following way,
POW = ABS(FFT(LC,+1))^2 * ( 2 / TOTAL(ERR^2) )
which is to say, it is normalized by the total variance of the time series, and a factor of 2. Assuming LC is real, then really only the first half of POW is independent.

Then POW should be distributed like a chi-square with 2 degrees of freedom. The mean value should be 2, the standard deviation should be 2. I just verified this with some random data.

I verified that CHISQR_CVF() produced reasonable numbers, compared to my own MPCHILIM() function, which also computes confidence limits. Sample code below.

Craig

```
lc = randomn(seed,2000)
err = dblarr(2000) + 1
POW = ABS(FFT(LC,+1))^2 * ( 2 / TOTAL(ERR^2) )
pow1 = pow(0:1000) ;; First half of power spectrum

print, avg(pow1)
;;  ==>     1.9769791
print, stddev(pow1)
;;  ==>     1.9997902
```

```
print, chisqr_cvf(0.05d, 2d)
;;  ==>     5.9914659
print, mpchilim(0.05d, 2d, /slevel)
;;  ==>     5.9914645
help, where(pow1 GE 5.9914645d)
;;  ==> <Expression>    LONG      = Array[38]
;;  (in other words, 38 out of 1000 or 3.8% of data exceeded
threshold)
```

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