Subject: Re: mpfit2dpeak and chi-square
Posted by Craig Markwardt on Tue, 25 Oct 2005 15:33:58 GMT
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JJMeyers2@gmail.com writes:

> Hello,
>
> I am trying to use mpfit2dpeak and I am trying to understand the result
> that comes out of chi-square, so I was wondering if someone can help me
> out. I am describing the problem.
> I have an image with random star positions x,y (the image has 2048x2048
> pixels). I am trying to fit the positions to a 2-d gaussian. I have a
> vague idea where the central density of the stars should be and I
> create a square of 400x400pixels around it and I calculate the density
> of different circles in this square in order to fit it to a gaussian.
> After running mpfit2dpeak the results I get for the gaussian parameters
> and the errors are reasonable. When I use the keyword CHISQ though I
> get a very big number (245781 which divided by 160000 is 1.5) which is
> very big and is not reasonable since the errors are very small and the
> fit looks very good. I was wondering if I am using the chisq in a wrong
> way and the result that I get is not what I think it is.
> Any suggestions?

Greetings,

The key to getting a good chi-square value is (a) using the right model function, and (b) having an appropriate estimate of the measurement uncertainties.

A 2D gaussian function may or may not be appropriate for your stellar profiles, only you can decide that. You can plot the residuals as a function of position and see whether there are any systematic trends. If there are, then it is likely that the 2D gaussian should be changed to something else. (Many times stellar profiles are fit with an empirical PSF).

The measurement uncertainties also need to be correct. The fact that you say the "errors are very small" suggests that your measurement uncertainties are too small, for one is a symptom of the other. Do you have Poisson errors? Gaussian errors? Etc. A simple test you can do is to fit a flat part with no stars to a constant function. Do you get a reduced chi-square close to 1? If not, then you probably have problems with your measurement uncertainties.

There are other systematic effects, for example if you have flat-fielding errors or gradients, or if there are cosmic ray hits. You'll have to check for those too.

Good luck,
Craig

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