Subject: Re: the problem of PERROR in MPFITFUN
Posted by James Kuyper on Thu, 15 Mar 2007 14:44:21 GMT
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duxiyu@gmail.com wrote:
> In my work, independent variable X is time and measured dependent
> variable Y is magnetic field. The instrument do not give the measured
> error.
> Do I use 1 in MPFITFUN for errors of Y?
> Is the PERROR useless at this time?
>
> I do not understand the following paragraph in the instructions of
> MPFITFUN.
> Who can give me some explanations for it?
>
> ; *If* you can assume that the true reduced chi-squared
> ; value is unity -- meaning that the fit is implicitly
> ; assumed to be of good quality -- then the estimated
> ; parameter uncertainties can be computed by scaling PERROR
> ; by the measured chi-squared value.
> ;
> ; DOF = N_ELEMENTS(X) - N_ELEMENTS(PARMS) ; deg of
> freedom
> ; PCERROR = PERROR * SQRT(BESTNORM / DOF) ; scaled
> uncertainties

To do proper curve fitting, you need error estimates for your data points. Using those error estimates, the reduced chi-squared value will typically be around 1.0 or better for a good fit; if it's much large than 1.0, you've probably got a poor fit and should try a different model function. If it is a good fit, the rate of change in the chi-squared function with respect to a change in a parameter estimate gives you a measure of how precisely determined that parameter is by this data set.

However, it's not uncommon to have no easy way to estimate the errors. This is a bad idea, and you should always try to fix it by coming up with a proper error estimate. However, if you're willing to assume that a) all the data points have exact the same error estimate and b) that the fit is a good one, then it is possible to calculate what error estimate would give you a chi-squared value of exactly 1.0. Using that error estimate will then allow calculation of the uncertainties in the parameter estimates.
This approach should not be used unless you have no alternative: it gives you no feedback to indicate whether or not you've got a good match between your model and the data that you are fitting it to.