
Subject: mpfit question

Posted by [Russell\[1\]](#) on Tue, 20 Dec 2011 17:02:27 GMT

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I searched these pages thinking this has been raised. I'm sure this is my mistake or misunderstanding, but if anyone has advice I'm all ears.

I'm using mpfit.pro as part of a multi-stage fitting routine to model the spectra of galaxies (1) brute-force fit over a grid of models, (2) mpfit to refine that solution so it's "off-the-grid", and (3) run an MCMC to marginalize over a few parameters --- the initial conditions of each stage are taken from the previous stage. I know certain parameters must be constrained within a range (for example, the distance cannot be negative), so I'm using that in the parinfo structure. For most galaxies this procedure works perfectly, but occasionally, I run into a problem child where the covariance matrix as returned by mpfit has a column (and row) of all 0.0. I'm using this covariance matrix as initial proposal distribution for the MCMC, so things go haywire when this happens. I suspect the column/row of zeroes is because that parameter hit the boundary or isn't properly varied in the LM-fitting. Does anyone have any experience with this? Will the parameters GTOL, XTOL, FTOL help? Or is this a problem with the entries in the parinfo structure (such as STEP or RELSTEP)?

Thanks!
Russell

Subject: Re: mpfit question

Posted by [Craig Markwardt](#) on Thu, 22 Dec 2011 02:44:14 GMT

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On Dec 20, 12:02 pm, Russell <rryan...@gmail.com> wrote:

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- > Will the parameters GTOL, XTOL, FTOL help? Or is this a problem with
- > the entries in the parinfo structure (such as STEP or RELSTEP)?

Greetings--

This *could* be a problem of your parameter touching a boundary. But that should be obvious for you to find out since you set the boundaries.

But I suspect this is more likely to be a problem of the category "why doesn't my fit converge?"

<http://www.physics.wisc.edu/~craigm/idl/fitqa.html#parstep>

Basically I recommend checking that your parameter values are all of about the same magnitude. If they aren't, then scale and/or offset them so that they are.

Also, I don't say it in my FAQ but the model should have approximately the same *sensitivity* to parameter variations. So if you are fitting parameters a and b , where $a=1.00000000\pm 0.00000001$ and $b=1.0\pm 0.1$, then you are likely have problems. Again, scale and/or offset your parameters so that they have comparable magnitudes and variations. This means that your model will need to understand how to re-scale and/or re-offset the variable to make a real physically meaningful parameter, but so be it. Doing this often helps a lot.

Happy {fitting,new year}!
Craig