
Subject: Re: scattering data with MPFITFUN

Posted by [Craig Markwardt](#) on Mon, 24 Jun 2013 01:59:37 GMT

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On Saturday, June 22, 2013 5:37:08 PM UTC-4, Nafiseh Masoumzadeh wrote:

> On Thursday, June 20, 2013 9:00:33 PM UTC+2, Craig Markwardt wrote:

>> On Thursday, June 20, 2013 4:23:27 AM UTC-4, Nafiseh Masoumzadeh wrote:

>>> On Thursday, June 20, 2013 5:51:16 AM UTC+2, Craig Markwardt wrote:

>>>> On Wednesday, June 19, 2013 6:49:43 PM UTC-4, Nafiseh Masoumzadeh wrote:

>>>>

>>>> > Hello,

>>>> >

>>>> > I have some data which I simply want to fit $p[0]*x^p[1]$ on them, But

>>>> > I don't know I am receiving very far results!

>>>> > I am using mpfitfun like this:

>>>> > start=[0.001, 0.1]

>>>> > results=MPFITFUN('MYFUNCTION', x, y, err, start)

>>>> >

>>>> > I applied this function and points in MATLAB (fitting toolbox) , and I had reasonable coefficients .

>>>> MPFITFUN can solve problems like this.

>>>>

>>>> What happens when you say,

>>>> YMODEL = MYFUNCTION(X, START)

>>>> Do you get sensible values for YMODEL?

>>>> You should also be checking the STATUS and ERRMSG keywords to see if there is a more informative error message.

>>>

>>> yes, I got reasonable result from YMODEL. and for STATUS I got 6 and I don't have any ERRMSG. I checked in MPFIT script that 6 for STATUS means

>>>

>>> FTOL is too small. no further reduction in

>>> ; the sum of squares is possible.

>>>

>>> but I cannot figure out what is the problem?

>>>

>>> STATUS=6 is not necessarily a good or bad thing. It usually means that a best fit was achieved.

>>>

>>> So let's assume the results of the IDL fit are RESULTS_IDL and the results from your Matlab fit are RESULTS_MATLAB. You can then compute the chi-square value for each.

>>> CHI_START = TOTAL((MYFUNCTION(X, START) - Y)^2 / ERROR^2)

>>> CHI_IDL = TOTAL((MYFUNCTION(X, RESULTS_IDL) - Y)^2 / ERROR^2)

>>> CHI_MATLAB = TOTAL((MYFUNCTION(X, RESULTS_MATLAB) - Y)^2 / ERROR^2)

>>> How different are these three values?

>>>

>>>

>>> I don't know how to calculate error for each case, but here is the results for

```

> (sum(residuals))^2 or TOTAL( (MYFUNCTION(X, START) - Y)^2 .
>
> start
> 16.4292
>
> IDI
> 106.596
>
> Matlab
> 2.39294
>
> I really don't know why for IDL is far from what should be. I think here I cannot attached any
figures since in figure it is clear that how much the result from IDL is different from my data points!

```

The chi-square value from the start is 16.4 and at finish of MPFITFUN it is 106.6? Sorry, but MPFITFUN will never make the chi-square value worse that it starts with.

Also, you say you don't know how to compute the error value, but you show that you are using "ERR" above in your function call. So I suspect that you made typographical errors.

Here is a complete worked example showing that MPFITFUN can solve this problem:

```

IDL> xx = 10^(dindgen(10)/3) ;; Evenly spaced in ALOG10(X)
IDL> ym = 5.337d * xx^(-1.672d) ;; Model Y values.
IDL> .compile
- function mypowerlaw, x, p
- return, p[0]*x^p[1] ;; Power law equation
- end
IDL> print, mpfitfun('mypowerlaw', xx, ym, 1d, [1d, 1d])
==> 5.337 -1.672
(final chi-square is zero because this is an exact solution; the starting chi-square value is
1274609)

```

And here is a second example show that it works with error bars as well.

```

IDL> ye = ym*0.1d ;; 10% errors
IDL> yy = randomn(seed,n_elements(ye))*ye + ym ;; Random Y values
IDL> print, mpfitfun('mypowerlaw', xx, yy, ye, [1d, 1d])
==> 5.2666485 -1.6647875

```

The solution is not exact because I added some random error to make it realistic. The final chi-square value is 8.58 for 8 degrees of freedom, and the starting value is 3.84e16).

So either your model function is not actually a power law. Or, you are not calling MPFITFUN() in the way that you say you are.

Craig Markwardt
