
Subject: Finding coefficients in multiple nonlinear equations using MPFIT

Posted by [Junum](#) on Sat, 29 May 2010 05:54:25 GMT

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Hi all,

I got a problem that I have spent several days, but did not solve.

I have two nonlinear equations.

Equation 1 has 6 coefficients (c1 through c6) and Eq. 2 has 5 equations (d1 through d5).

Eq. 1 : $c1 * A * B^{c2} + c3 * C^{c4} + c5 * \exp(D^{c6}) = 0$

Eq. 2 : $d1 * (A/B)^{d2} + d3 * (1/C)^{d4} = 0$

Actually, original equations are much complex.

From lab experiments I have data sets of A, B, C, and D, more than 40000.

My goal is to find optimum coefficients using these large data sets.

I've tried to use MPFIT, but it seems that MPFIT has limit to define a function.

What I did is

```
expr = '[ '
st = 31
en = 44
FOR j=st,en DO BEGIN
    s_L    = STRING(FORMAT='( D9.3)',L[j])    + 'D'
    s_Lapp = STRING(FORMAT='( D9.3)',Lapp[j])  + 'D'
    s_Z    = STRING(FORMAT='(D11.6)',Z[j])    + 'D'
    s_foc  = STRING(FORMAT='( D8.3)',foc[j])  + 'D'
    s_rnd  = STRING(FORMAT='( D8.3)',round[j]) + 'D'
    s_bg   = STRING(FORMAT='(D11.5)',bg[j])   + 'D'

    exp1 = '(-1.*' + s_foc + ')'
    exp2 = ' ( ABS(' + s_L + '/' + s_rnd + ')^P[5] )'
    exp3 = '(' + s_bg + ')'
    exp4 = '(-1.*ABS(P[1]*( ' + exp3 + '^P[3] )) )'
    exp5 = ' ( ABS(' + s_Z + ' + ABS(' + s_Z + ')^P[2] )^P[4] )'
    exp6 = ' ( EXP(' + exp4 + ' * ' + exp5 + ') )'

    expr1 = exp1 + ' + ' + exp2 + ' * ' + exp3 + ' * ' +
exp6 + ' * P[0]'

    exp7 = '(-1.*(' + s_Lapp + '/' + s_L + ') )'
    exp8 = '(' + s_Z + '/(( ' + s_L + '* ' + s_rnd + ')^(2.)) )'
    exp9 = '(ABS(' + exp8 + '))'
    exp10 = '(' + exp9 + ' * P[7] )'
    exp11 = '(' + exp9 + ' + ' + exp10 + ')^P[8] )'
    exp12 = ' ( ((' + s_L + ')^P[10])*P[9] )'
```

```
exp13 = '(' + exp11 + '*' + exp3 + ')'
```

```
expr2 = exp7 + ' + ' + exp13 + '*' P[6] + ' + exp12
```

```
IF ( j eq st ) THEN BEGIN
```

```
    expr = expr + expr1 + ', ' + expr2
```

```
ENDIF ELSE BEGIN
```

```
    expr = expr + ', ' + expr1 + ', ' + expr2
```

```
ENDELSE
```

```
ENDFOR
```

```
expr = expr + ' ]'
```

```
fit_status = 0
```

```
num_iter = 0
```

```
resid = 0.D
```

```
st_gs = [-10., -10., -10., -10., -10., -10., -10., -10., -10.,  
-10., -10. ]
```

```
P = mpfitexpr(expr, 1, 1, 0.1, st_gs, MAXITER=900)
```

14 (so 28 elements on defined function) is ok, but 15 (so 30 elements on defined function) does not work.

How can I solve this problem?

Can any one help me?

Thank you.

Jun
