Subject: Minimization of deviations from multiple curve fits.
Posted by aaron_forster on Mon, 26 May 2003 21:59:42 GMT
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Hello Group,

I am utilizing IDL to analyze data obtained from adhesion tests. For those interested, the tests are used to determine the work of adhesion and system modulus. I measure contact area, load, and displacement during the test. I currently use Craig Markwardt's MPFIT program to fit two different non-linear equations to the experimental data. The first equation (EQ1) expresses contact area as a function of load, with the work of adhesion, system modulus, and indenter radius as fitting parameters. The second equation (EQ2) expresses displacement as a function of load and contact area, with the system modulus and indenter radius as fitting parameters. It has been suggested by others (Chin P. et al., J. Adhesion, 1997, 64 p. 145-160) that I can increase the precision by analyzing the fit deviations from each curve fit together. In other words, I need to minimize the function:

omega^2=sum {[EQ1_fit - EQ1i] + [EQ2_fit - EQ2i]^2}

where sum is the sum from i=1 to N of my data (EQ1, EQ2) and my fit (EQ1_fit, EQ2_fit)

I hope the above equation is clear to everyone. Anyway, my understanding of the regression programs I have seen in IDL is that they will fit an equation and measure success of fit by minimizing chi-sqr. My question is how do I both minimize chi-sqr for each equation AND minimize omega^2, such that the fitting parameters I obtain at the end of the day will provide satisfactory fits for EQ1 and EQ2. I hope this post is clearly written, but I am an IDL newbie and I may have left relevant information out. If you would like to hear more, please email me at aaron_forster@yahoo.com with questions. Thank you in advance for all of your help. I greatly appreciate it.

Sincerely,
Aaron Forster