Subject: Re: power law fitting for errors on both coordinates
Posted by news.verizon.net on Tue, 11 Apr 2006 14:34:06 GMT
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A few years back I wrote the following about using an effective variance to fit a polynomial with errors in both coordinates, and the method can presumably be applied to a power-law

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Orear (1982, Am.J. Phys, 50, 912) give the following solution for fitting a polynomial with errors in both X. and Y. One uses standard fitting techniques (e.g. POLYFITW or Craig Markwardt's MPFIT) with the error only in the Y coordinate, but with the Y error replaced by an effective variance. err^2 = erry^2 + ((dy/dx)*errx)^2
In the case of a quadratic y = a*x^2 + b*x +c you would have
err^2 = erry^2 + ((2*x*a +b)*errx)^2

Now the coefficients a and b what you are trying to find, so that one has to iterate. Start by fitting with only the Y errors, solve for a and b, then compute the effective variance and redo the fit. Continue as necessary.
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I also gave a warning that the method is not mathematically rigorous.
The Mathematica documentation for nonlinear fits
(http://documents.wolfram.com/applications/eda/FittingDataToN onlinearModels.html
)
gives this warning

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When there are errors in both coordinates, FindFit also calculates the error in the dependent variable based on the effective variance. However, although there is a fairly comprehensive literature on using this technique in linear fits, the main justification for using effective variances in nonlinear fits is based only on a series of experiments in which it was found that the algorithm of FindFit would produce reasonable results most of the time.
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--Wayne