

Letter to the Editor

Fitting Experimental Data

In 1969 Southwell [1] published a paper under the above title dealing with the important problem of least-squares fitting of data to functions nonlinear in their parameters when both the dependent and independent variables are subject to random error. Since this is the usual experimental situation, except in rare whole number cases where the data values are intrinsically discrete and, thus, possibly error-free, the provision of a useful solution to the general fitting problem would be a valuable contribution.

Although Southwell makes broad claims for his method, they must be rejected. His claims and method have recently been discussed and found generally inapplicable [2]. The only function he actually fits to data involving uncertainties in both variables is the straight line, linear in both the variables and the parameters. During the development of an improved solution of the problem, Southwell's method was applied to many combinations of data and functions more complex than that of the straight line. Even with very close estimates for the initial values of the parameters, his iterative method generally failed to converge at all.

The new method [2] converges extremely rapidly for all but the most pathological functions. It does not require the calculation of algebraic partial derivatives, frequently a difficult, error-generating task for complicated functions. Finally, unlike a recent, less rapidly convergent method [3] applicable only for polynomials, it can handle functions of any form, nonlinear in both the variables and the parameters.

The new method has been fully described [2], but, to encourage its general use, a Fortran program listing can be obtained from the author.

REFERENCES

1. W. H. SOUTHWELL, *J. Computational Phys.* **4** (1969), 465.
2. D. R. POWELL AND J. R. MACDONALD, *Computer J.* **15** (1972), 148.
3. M. O'NEILL, I. G. SINCLAIR, AND F. J. SMITH, *Computer J.* **12** (1969), 52.

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