STATISTICAL ERROR PROPAGATION

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The simple but often neglected equation for the propagation of statistical errors in functions of correlated variables is tested on a number of linear and nonlinear functions of parameters from linear and nonlinear least-squares (LS) fits, through Monte Carlo calculations on 10 000 - 400 000 equivalent data sets. For linear functions of linear LS parameters, the error propagation equation is exact. Nonlinear parameters and functions yield nonnormal distributions, but their dispersion is still well predicted by the propagation-of-error equation if their relative standard errors are less than 0.1. Often the error computation can be bypassed by a redefinition of the least-squares model to include the quantity of interest as an adjustable parameter, in which case its variance is returned directly in the variance-covariance matrix. This approach is shown formally to be equivalent to the error propagation method.