# RELATIVE RESIDUALS CONSIDERED AS WEIGHTED SIMPLE RESIDUALS IN THE APPLICATION OF THE METHOD OF LEAST SQUARES

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In a recent paper the writer[1] discussed some considerations involved in fitting a curve, by the method of least squares, to data in which the magnitude of the errors of measurement was affected by the size of the dependent variable. For the special case in which the percentage errors of measurement were distributed normally, it was shown that the most probable values of the dependent variable could be calculated by minimizing the sum of the squares of residuals of the type, $V - \frac{Y}{f(X)}$, with respect to $V$, $V$ being the arithmetic mean of the ratios of the observed values of the dependent variable to the corresponding calculated values and equal to unity at that minimum.

The concept of a relative residual has a certain value to the investigator as an aid in visualizing the nature of such a set of data. However, it is possible to use a different method of analysis, based on the theory of weighting, which will yield exactly the same results when applied to such a set of data and in addition possesses the advantage of being applicable to more general problems in which the relation of the errors of measurement to the values of the dependent variable is more complex.

Standard texts on the method of least squares such as that by Merriman,[2] show that if the probability of the occurrence of an error of a given magnitude varies for measurements of successive values of the dependent variable, it is necessary to weight the observation equations when fitting the curve. If the errors of

[1]Hendricks, Walter A. 1931. The use of the relative residual in the application of the method of least squares. *Annals of Mathematical Statistics*, 2 (4): 458-478.

[2]Merriman, Mansfield. 1907. The method of least squares. 230 p., illus. John Wiley & Sons, New York.