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(54) **ENHANCED MODEL IDENTIFICATION IN SIGNAL PROCESSING USING ARBITRARY EXPONENTIAL FUNCTIONS**

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(58) **Field of Search** 702/179–199; 703/2

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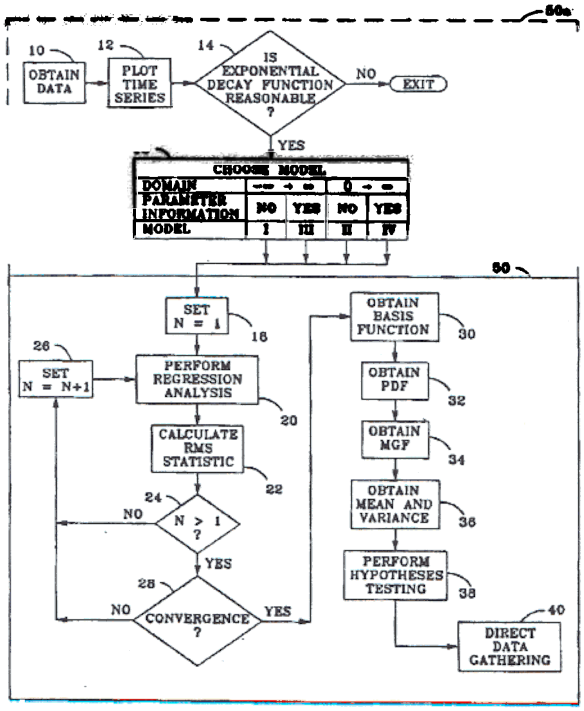
(57) **ABSTRACT**

A method for finding a probability density function (PDF) and its statistical moments for a chosen one of four newly derived probability models for an arbitrary exponential function of the forms $g(x)=\alpha x^m e^{-\beta x^n}$, $-\infty<x<\infty$;

$$g(x)=\alpha x^m e^{-\beta x^n},\ 0\le x<\infty;$$

$$g(x)=\alpha\left(\frac{x-a}{b}\right)^m e^{-\beta\left(\frac{x-a}{b}\right)^n},\ -\infty<x<\infty;\ \text{and}$$

$$g(x)=\alpha\left(\frac{x-a}{b}\right)^m e^{-\beta\left(\frac{x-a}{b}\right)^n},\ 0\le x<\infty.$$

The model chosen will depend on the domain of the data and whether information on the parameters a and b exists. These parameters may typically be the mean or average of the data and the standard deviation, respectively. Non-linear regression analyses are performed on the data distribution and a basis function is reconstructed from the estimates in the final solution set to obtain a PDF, a moment generating function and the mean and variance. Simple hypotheses about the behavior of such functional forms may be tested statistically once the empirical least squares methods have identified an applicable model derived from actual measurements.

16 Claims, 2 Drawing Sheets