a point source and a paper thyroid phantom obtained by using a rectilinear scanner with a honey-comb collimator.

The computation for the image restoration was performed by an IBM-7090 electronic computer.

The second-order moments were calculated from a central part of the smoothed and normalized resolving power array that consisted of a circular domain with a radius of 15 elemental images.

The result suggests that the resolving power array is almost axially symmetrical.

To visualize the effectiveness of the present method, the width at the half-maximum of the transverse profile curve of the resolving power array through the center was compared before and after the image restoration. The first approximation of the differential operator method resulted in sufficient sharpening of the point spread function and yielded a slight narrower half-maximum width than did the third iteration of the iterative approximation method.

Moreover, the former needed a much shorter computation time (about 2 minutes) than did the latter (about 30 minutes).

As the next step, the digital scan data of the thyroid phantom was used. It may be concluded that the blurred image of the phantom seemed to be focused more sharply by the differential operator method than by the iterative approximation method.

The present method, however, yielded more mottleness than did the iterative approximation method, suggesting that the former is more sensitive to the statistical fluctuation included in the original data than does the latter.

Although further investigation would be necessary to determine the choice of these two mathematical focussing method, it can be concluded that the newly proposed method of image restoration is less time-consuming, and might be applicable to the on-line real time data-processing.

Moreover, one may be able to build an analog computig-circuit based on the similar mathematical principle in any radioisotope imaging system themselves.

Operational Count Rate Meters and Their Application to Scinti-Scan

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The operational count rate meter is proposed which has a more suitable response for a particular purpose of measurement. The characteristics of the rate meter are specified by the step response F(t), the impulse response f(t), and the frequency response W(w), and there are following relations between them:

$$f(t)=\frac{d}{dt}F(t)$$

$$W(\omega)=\int_0^{\infty} f(t)\ e^{-j\omega t}\,dt$$

The relative standard deviation of the output is given by

$$\sigma=\frac{1}{\sqrt{nT}}$$

where n is the count rate and T is the "equivalent time constant" given by the following equation:

$$T=1/\int_0^{\infty}[f(t)]^2dt=2\pi/\int_{-\infty}^{+\infty}|W(\omega)|^2d\omega$$

A simple circuit using two CR pairs is proposed, and the formulas for its performance are given. It can be used with desired response of over-, critical-, or under-damping. A critical-damped or a slightly under-damped rate meter provides the more quick response for a sudden change in radiation intensity than the conventional rate meters.

For a band-limited input signal, the under-damped rate meter can enhance the fast varying component of the signal. The application to radio-isotope imaging is proposed to improve the blur in the image. The experiment based on electronic simulation shows that the spatial resolution can be improved by a factor of about 1.8 without appreciable image distortion.