ARRAY TRANSDUCER RECEIVER SYSTEM FOR ULTRASONIC TOMOGRAPHY

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One of the problems of Ultrasonic Tomography /UT/ is the non-straight line propagation of the ultrasound in the medium of interest. Several schemes are presently available to overcome this problem. Itoh at al /1/ scan the transmitter and receiver with a microprobe and depending on the peak in the intansity distribution at the receiver, a suitable path is assigned to the ultrasonic beam. Refraction corrections have also been suggested through iterative and inverse scatter solutions /2/; however, for large density variations within an object, this is still a problem.

In the present method, instead of using a microprobe to scan the transducers /which is a time consuming process/, a receiver transducer consisting of a linear array is used. Initially, three transducers are mounted side by side /along the plane of scan/ with the middle one in line with a single transmitter. The spacing between the receiver transducers depends on the transmitter beamwidth and also on the maximum spatial frequency of the object. A linear scanner consisting of three receivers controlled by a Z-80 microprocessor is used for initial phantom studies. At each position, time-of-flight and peak value of signals received are acquired. A sorting algorithm is used to form projections and images are reconstructed from the projections using standard algorithms available.

Initial studies with the three transducer receiver array indicate an improvement in image quality. A focussed beam system along with a transducer array with improved lateral resolution is expected to further enhance the image quality.

REFERENCES

1. Takashi Itoh et al 'Image degradations in ultrasonic CT' IEEE Ultrasonic Symposium, 1981.

2. R.K. Muller, 'A New approach to acoustic Tomography using diffraction techniques' Acoustic Imaging, Vol 8, 1978.