with wave propagation is evident. The hydrophone output obtained at a single location but several depths in brain tissue (Figure 2b, hole no. 3) and at the same depth but three separate locations (hole nos. 8, 3, 13) are shown in Figure 3c,d, respectively. The time delay between traces in these figures was not as evident since they are at approximately the same distance away from the center of applicator. These results confirm the propagating nature of microwave-induced acoustic pressure waves in the cat brain.

A representative frequency response is shown in Figure 4. It is seen that a distinct fundamental component occurred at 40 kHz, the predicted fundamental mode of a 5-cm diameter brain sphere [Lin, 1978]. The measured frequency response showed, in addition, several higher-order components as suggested by prior theoretical and experimental investigations [Lin, 1977a,b; Olsen and Lin, 1983]. It should be noted that the thermoelastic theory prescribed a frequency response which was a simple function of the head size and speed of pressure wave propagation, independent of power deposition pattern. Thus, it is interesting to observe the comparable frequency responses of the present study and the predictions based on a spherical head with symmetric power deposition that peaked at the center.

The speed of thermoelastic pressure wave propagation in the cat brain may be derived from the measured time delay and known distance traveled. As given in Table 1, the mean speed of propagation was 1522.77 m/s. This was based on an ensemble

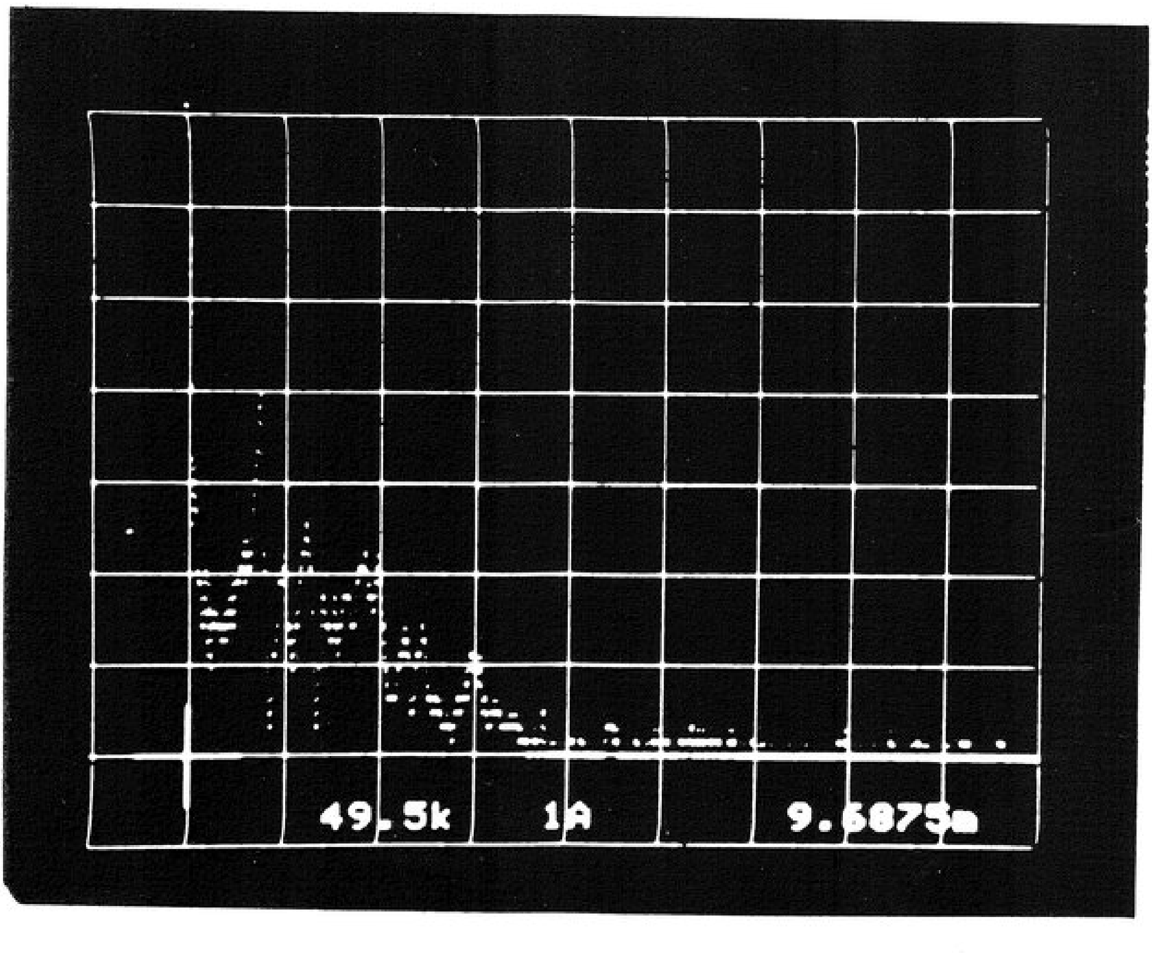

Fig. 4. A representative frequency spectrum of the thermoelastic pressure wave horizontal scale is 49.5 kHz/div.