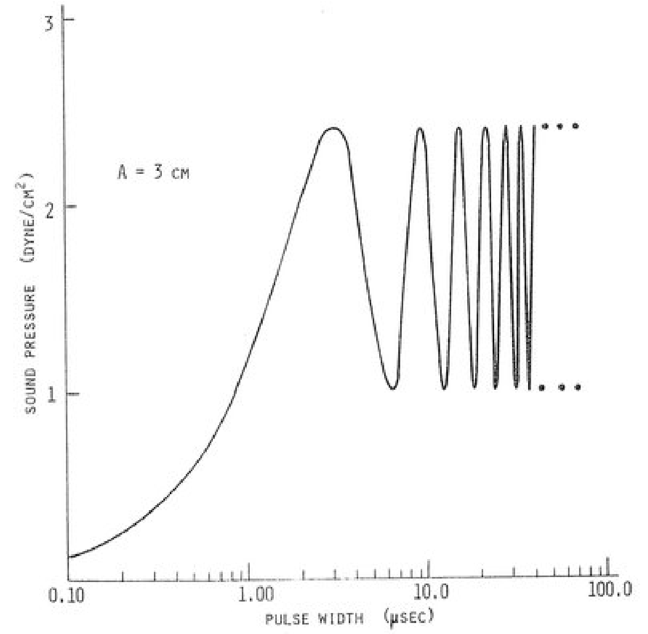


Fig. 7. Sound pressure amplitude generated in a 3-cm-radius spherical head exposed to 2450-MHz plane wave as a function of pulsewidth. The peak absorbed energy is 1000 mW/cm$^3$.

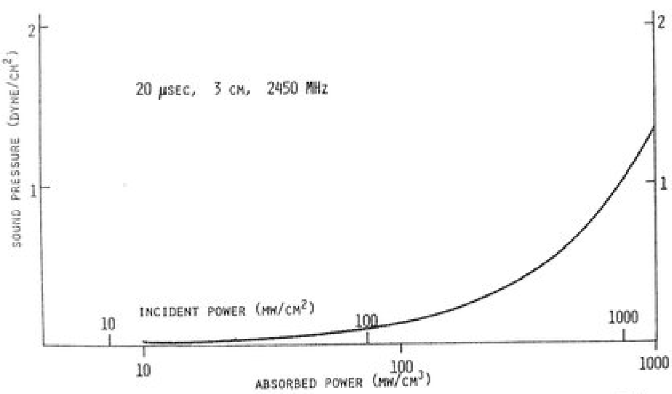


Fig. 8. The dependence of sound pressure amplitude generated in a 3-cm-radius spherical head exposed to 2450-MHz plane wave on peak incident and absorbed powers. The pulsewidth is taken to be 20 μs.

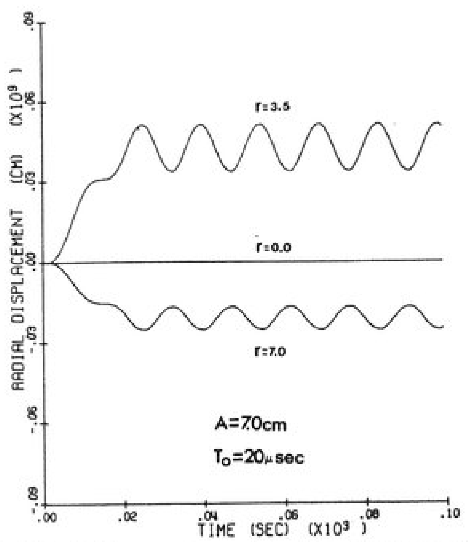


Fig. 9. Radial displacement as a function of time a 7-cm-radius spherical head exposed to 918-MHz plane wave. The peak absorption is 1000 mW/cm$^3$.

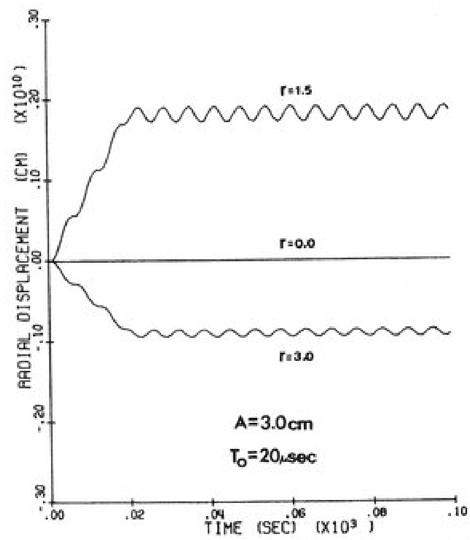


Fig. 10. Radical displacement as a function of time of a 3-cm-radius spherical head exposed to 2450-MHz plane wave. The peak absorption is 1000 mW/cm$^3$.

expected, the displacement at the center of the sphere is zero. At other locations the displacement increases almost linearly as a function of time until $t = t_0$, the pulsewidth, and then starts to oscillate around the value attained at $t = t_0$. In both cases, the maximum displacements are on the order of $10^{-11}$ cm. The displacements stay constant after a transient buildup because of the lossless assumption for the elastic media. The apparent higher frequency of oscillation seems to stem from the contribution of higher order modes. But how these frequencies are chosen over all others is not clear. Further investigations are currently in progress.

The sound pressures (radial stresses) in the spherical head models are shown in Figs. 11 and 12 for the corresponding cases shown in Figs. 9 and 10. It is interesting to note that the sound pressure begins with zero amplitude and then grows to an intermediate value. With a sudden rise of amplitude the main body of the pressure wave arrives, oscillating at a constant pressure level in the absence of elastic loss. The final jump in amplitude is marked by $t = t_0$.

## IV. Conclusions

We have presented a model for sound wave generation in spheres simulating heads of laboratory animals and human beings by assuming a spherically symmetric microwave absorption pattern. The impinging microwaves are taken to be plane wave rectangular pulses. The problem has been formulated in terms of thermoelastic theory in which the absorbed microwave energy represents the volume heat source. The thermoelastic equation of motion is solved for the sound wave under stress-free boundary conditions using boundary value technique and Duhamel's theorem. The extension to constrained surface is currently under investigation. It may be noted that the related case of micro-