TABLE 1. Thermoelastic properties of brain matter [*Lin,* 1977a].

Specific Heat, c_h	0.88 cal/g-°C (0.21 J/g-°C)
Density, ρ	1.05 g/cm^3
Coefficient of Thermal Expansion, α	4.1×10^{-5}/°C
Lame's Constant, λ	2.24×10^{10} dyn/cm^2
Lame's Constant, μ	10.52×10^{3} dyn/cm^2
Bulk Velocity of Propagation, c_1	1.46×10^{5} cm/s

If we choose the median of these two curves, it can be seen that, for a guinea pig (a = 2 cm), the predicted fundamental frequency is 45 kHz, which is close to that measured by *Chou et al.* [1975]. For a typical cat (a = 3 cm) the measured cochlear microphonic frequency is 38 kHz. Figure 1 shows a computed frequency of 30 kHz. The computed frequency for an infant (a = 5 cm) and an adult human being (a = 7 cm) are 18 and 13 kHz, respectively. Although experimental data that are directly applicable to this case are not available, related results have indicated that a necessary condition for auditory perception by adults seems to be the ability to hear sounds above 5 to 8 kHz [*Frey,* 1961; *Rissmann and Cain,* 1975].

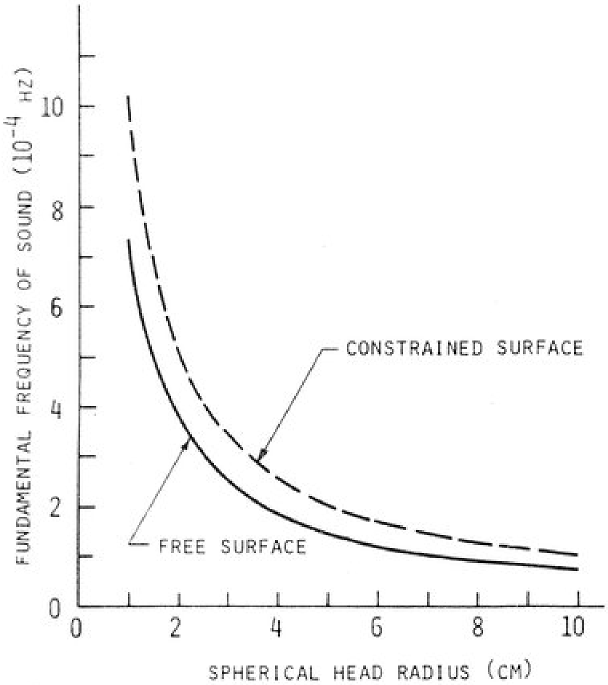

Fig. 1. Predicted fundamental frequency of vibration of a spherical head in a pulse-moderated microwave field.

3.2. *Peak pressure and displacement.*

Extensive numerical computations have shown that, although the resultant waveforms are qualitatively similar, both pressures and displacements that are computed on the basis of the constrained-surface formulation are consistently higher than those calculated using the stress-free expressions. Moreover, better agreement between theory and experiment exists for the constrained-boundary formulation. The following presentation is therefore specifically related to the constrained-boundary expressions given by equations (13) to (20).

Figures 2 and 3 show the peak pressure and displacement at r = 0, 1 and 2 cm for a sphere of 2-cm radius that stimulates the head of a guinea pig under 2450-MHz radiation. In this case the approximate microwave absorption pattern is obtained by setting N = 3. These waveforms are evaluated for t_0 = 10 μsec. It is seen that the pressure is the highest at the center of the head and has a maximum value of 4.08 dyne/cm^2 for a peak absorption rate of 1 W/g (which corresponds to a power density 445 mW/cm^2 of incident energy [*Johnson and Guy,* 1972]) at the end of the pulse and then oscillates around a constant average value in the absence of elastic damping. As expected, the displacement is zero both at the center and at the surface of the sphere for the constrained-boundary condition. The peak displacement at r = 1.0 cm is about 2.16×10^{-13} meters. Note that a high-frequency component is superimposed on top of the fundamental frequency, which correlates perfectly with that shown in Figure 1.

The peak pressure and displacement at r = 0, 1.5 and 3.0 cm for a 3-cm sphere, which simulates the head of a cat exposed to 2450-MHz radiation, are illustrated in Figures 4 and 5. In this case the approximate microwave absorption pattern is obtained by setting N = 6. Again, the pressure is the highest at the center, and has a value of 3.69 dyne/cm^2 for a peak absorption rate of 1 W/g or 589 mW/cm^2 of incident energy. Quantitative comparisons with two series of experimental threshold determinations [*Guy et al.* 1975; *Rissmann and Cain,* 1975] indicate that the computed threshold is extremely close to the measured ones [*Lin,* 1977b]. The displacement in the model of the cat's head is about 1.51×10^{-13} meters. The fundamental frequency of oscillation ob-