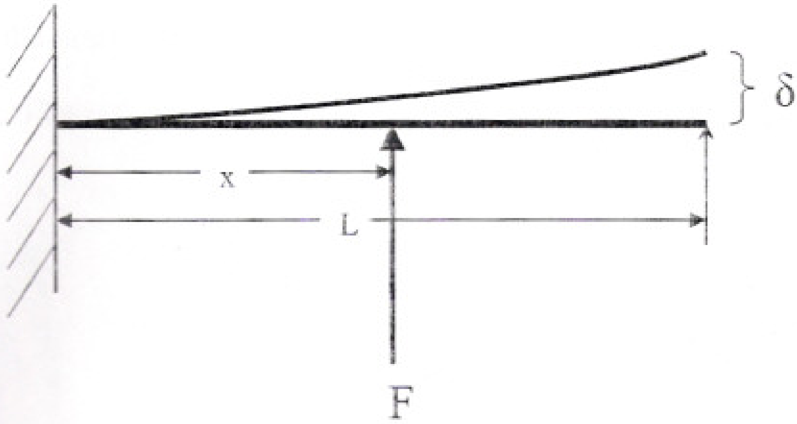

Figure 11. Cantilever beam model of stimulator base using magnetic force to produce vibrations.

Because we can assume the force is acting from the center of the coil, we know that x is simply $L/2$. The deflection, or in our case, the amplitude of vibration, is determined from Eqn. (2) below. Note that this is the maximum deflection, so we must be sure that the outer edge of the beam is where the stimulator is mounted.

$$\delta = \frac{Fx^2}{6EI}(3L - x) \qquad (2)$$

But because we know the value of x in terms of L, Eqn. (2) can be rewritten as:

$$\delta = \frac{F\left(\frac{L}{2}\right)^2}{6EI}\left(3L - \frac{L}{2}\right) = \frac{FL^2}{24EI}\left(\frac{5}{2}L\right)$$

$$= \frac{5}{48}\frac{FL^3}{EI} \approx 0.104\frac{FL^3}{EI} \qquad (3)$$

where I is the area-moment of inertia and E is Young's Modulus for the beam material. Because we are operating on A/C, we need to realize that the direction of current changes 60 times per second, as therefore so does the direction of the magnetic force. However, since we are using a