

Governing eqn. $\rightarrow m\ddot{x} + c\dot{x} + Kx = m_0 e \omega r^2 \sin \omega t$

$$F_0 = m_0 e \omega r^2 \left(\text{lbm} \cdot \text{ft} \cdot \frac{\text{rad}^2}{\text{s}^2} \right)$$

$$\downarrow \text{lbm} \cdot \text{ft} / \text{s}^2$$

F_0

NOTE: $1 \text{ lbf} = 32.2 \text{ lbm} \cdot \text{ft} / \text{s}^2$

Natural Frequencies of Mesquite Beans (BENDING)

$$\omega_{n1} = 8.0486 \text{ Hz}$$

$$\omega_{n2} = 24.045 \text{ Hz}$$

$$8.0486 \frac{\text{cycles}}{\text{s}} \times \frac{2\pi \text{ rad}}{1 \text{ cycle}} = 50.571 \text{ rad/s}$$

$$24.045 \frac{\text{cycles}}{\text{s}} \times \frac{2\pi \text{ rad}}{1 \text{ cycle}} = 151.079 \text{ rad/s}$$

$$\rightarrow \omega_{n1} = 50.571 \text{ rad/s} \approx 16\pi \text{ rad/s}$$

$$\rightarrow \omega_{n2} = 151.079 \text{ rad/s} \approx 48\pi \text{ rad/s}$$

NOTE: $\omega_{n1} \approx \frac{\omega_{n2}}{3}$; $\omega_{n2} = 3\omega_{n1}$