

5. The magnitude of the maximum acceleration is given by $a_m = \omega^2 x_m$, where ω is the angular frequency and x_m is the amplitude. The angular frequency for which the maximum acceleration is g is given by $\omega = \sqrt{g/x_m}$, and the corresponding frequency is given by

$$f = \frac{\omega}{2\pi} = \frac{1}{2\pi} \sqrt{\frac{g}{x_m}} = \frac{1}{2\pi} \sqrt{\frac{9.8 \text{ m/s}^2}{1.0 \times 10^{-6} \text{ m}}} = 500 \text{ Hz} .$$

For frequencies greater than 500 Hz, the acceleration exceeds g for some part of the motion.