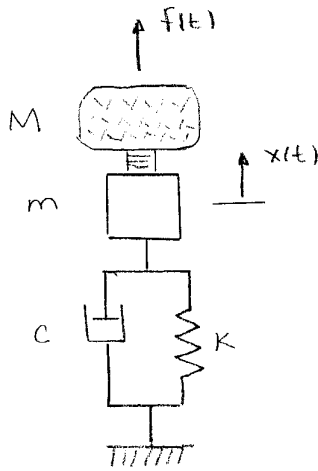


Piezoelectric Actuator

$$(a) \sqrt{\frac{K}{m+0.1}} = 900(2\pi)$$

$$\sqrt{\frac{K}{m+0.15}} = 800(2\pi)$$

$$\Rightarrow \frac{m+0.15}{m+0.1} = \left(\frac{9}{8}\right)^2$$

$$\Rightarrow m = \frac{1.5}{17} = 0.08824 \text{ kg}$$

$$\sqrt{\frac{K}{m+0.1}} = \sqrt{\frac{K}{0.08824+0.1}} = 900(2\pi) \Rightarrow K = 6.02 \times 10^6 \text{ N/m}$$

$$\omega_n = \sqrt{\frac{K}{m}} = \sqrt{\frac{6.02 \times 10^6}{0.08824}} = 8259 \text{ rad/s} = 1314 \text{ Hz}$$

(b) (i) bandwidth $\approx 100 \text{ Hz}$

$$(ii) \text{ dB} = 20 \log_{10}(2 \times 10^{-8})$$

$$= -154 \text{ dB}$$

(iii) 40 dB/decade

