

Calculus

$$y = A \cdot \sin \left(\frac{2\pi \cdot t + C}{B} \right) + D$$

$$\Delta x(t) = a \cdot \sin(\omega t + \phi)$$

$$a = A = (0,2530 \pm 0,0003)$$

$$\omega = \frac{2\pi}{B} = (14,850 \pm 0,007)$$

$$\phi = C = -(0,0019 \pm 0,0002)$$

$$m = (0,2030 \pm 0,0001) \text{ Kg}$$

$$\omega = \sqrt{\frac{K}{m}} \rightarrow K = m \cdot \omega^2 = 0,203 \cdot (14,85)^2$$

$$K = 47,76607 \text{ N/m}$$

$$\Delta K = K \cdot \sqrt{\left(\frac{dK}{dm} \cdot \Delta m \right)^2 + \left(\frac{dK}{d\omega} \cdot \Delta \omega \right)^2}$$

$$\Delta K = K \cdot \sqrt{(\omega^2 \cdot \Delta m)^2 + (2m\omega \cdot \Delta \omega)^2}$$

$$\Delta K = 47,76607 \cdot \sqrt{((14,85)^2 \cdot (0,0001))^2 + (2 \cdot 0,203 \cdot 14,85 \cdot 0,007)^2}$$

$$\Delta K = 2,27$$

$$K = (48 \pm 2) \text{ N/m}$$