193. Gekoppelte physikalische Pendel

$$m = 5 \text{ kg}; \quad k = 2 \text{ N/m}; \quad a = 0.1 \text{ m}; \quad h = 0.4 \text{ m}; \quad l = 0.1 \text{ m}$$

a) $\omega_a =$

$$I = \frac{1}{12} m(a^2 + h^2) + ml^2 = 0.12 \text{ kg m}^2$$
$$\omega_a = \sqrt{\frac{mgl}{I}} = \underline{\underline{6.37 \text{ rad/s}}}$$

b)

196. Schallgeschwindigkeit und Elastizitätseigenschaften

$$\rho = 4500 \text{ kg/m}^3; \quad v_\parallel = 5050 \text{ m/s}; \quad v_\perp = 3100 \text{ m/s}$$

a) $v_\parallel = \sqrt{\frac{E}{\rho}}; \quad v_\perp = \sqrt{\frac{G}{\rho}}$

$$E = {v_\parallel}^2 \rho = \underline{\underline{1.15 * 10^{11} \text{ Pa}}}$$
$$G = {v_\perp}^2 \rho = \underline{\underline{4.32 * 10^{10} \text{ Pa}}}$$

b) $\mu = \frac{E}{2G} - 1$

$$\mu = \frac{{v_\parallel}^2}{2{v_\perp}^2} - 1 = \underline{\underline{0.33}}$$

c)

$$\mu = \underline{\underline{\frac{{v_\parallel}^2}{2{v_\perp}^2} - 1}} \qquad \text{oder} \qquad \frac{v_\parallel}{v_\perp} = \underline{\underline{\sqrt{2\mu + 2}}}$$

199. Kompensation der Wärmeausdehnung