

Rezolvare Tema 1

Deducerea ec. dimensionale pt.:

1) impuls : $p = m \cdot v \Rightarrow [p] = [m] \cdot [v] = M \cdot L \cdot T^{-1}$

2) lucru mecanic : $w = F \cdot d \Rightarrow [w] = [F] \cdot [d] = M \cdot L^2 \cdot T^{-2}$

3) densitate : $\rho = \frac{m}{v} ; [\rho] = \frac{[m]}{[v]} = M \cdot L^{-3}$

4) presiune : $[p] = \frac{[F]}{[S]} = \frac{M \cdot L \cdot T^{-2}}{L^2} = M \cdot L^{-1} \cdot T^{-2}$

5) putere : $P = \frac{w}{t} ; [P] = \frac{[w]}{[t]} = \frac{M \cdot L^2 \cdot T^{-2}}{T} = M \cdot L^2 \cdot T^{-3}$

6) const. gravitat. : $F = k \cdot \frac{m_1 \cdot m_2}{r^2} \rightarrow k = \frac{F \cdot r^2}{m_1 \cdot m_2}$

$\Rightarrow [k] = \frac{[F] \cdot [r^2]}{[m_1] \cdot [m_2]} = \frac{M \cdot L \cdot T^{-2} \cdot L^2}{M^2} = M^{-1} L^3 T^{-2}$

7) modulul lui Young : $\frac{F}{S} = E \cdot \frac{\Delta l}{l_0} \Rightarrow E = \frac{F \cdot l_0}{S \cdot \Delta l}$

$\Rightarrow [E] = \frac{[F] \cdot [l_0]}{[S] \cdot [\Delta l]} = \frac{M \cdot L \cdot T^{-2} \cdot L}{L^2 \cdot L} = M \cdot L^{-1} \cdot T^{-2}$

$$8) \text{ presiunea hidrostatică: } p = \rho g h$$

$$[p] = [\rho] \cdot [g] \cdot [h] = M \cdot L^{-3} \cdot L T^{-2} \cdot L$$

$$[p] = M \cdot L^{-1} T^{-2}$$

$$9) \text{ const. univ. a gazelor: } pV = \nu RT$$

$$\Rightarrow R = \frac{p \cdot V}{\nu \cdot T}$$

$$[R] = \frac{[p] \cdot [V]}{[T]} = \frac{M \cdot L^{-1} T^{-2} \cdot L^3}{T} = M L^2 T^{-3}$$

$$10) \text{ const. elastică: } F = k \cdot x \Rightarrow k = \frac{F}{x}$$

$$[k] = \frac{[F]}{[x]} = \frac{M L T^{-2}}{L} = M T^{-2}$$

• Sa se deducă formula vit. undelor transversale dintr-o coardă vibrantă, functie de forța de tensiune din coardă, densitatea și secțiunea coardei; utilizând omogenitatea formulelor fiz.

$$v = F^\alpha \rho^\beta S^\delta$$

$$L T^{-1} = (M L T^{-2})^\alpha (M L^{-3})^\beta (L^2)^\delta$$

$$L T^{-1} = M^{\alpha+\beta} L^{2-3\beta+2\delta} T^{-2\alpha}$$

$$\Rightarrow \left. \begin{cases} \alpha + \beta = 0 \\ 2 - 3\beta + 2\delta = 1 \\ -2\alpha = -1 \end{cases} \right\} \Rightarrow \left. \begin{cases} \alpha = \frac{1}{2} \\ \beta = -1/2 \\ \delta = -1/2 \end{cases} \right\} \Rightarrow v = F^{1/2} \rho^{-1/2} S^{-1/2}$$

$$v = \sqrt{\frac{F}{\rho \cdot S}}$$