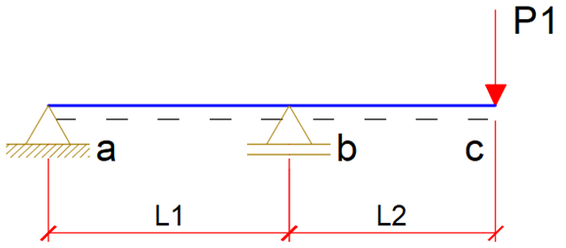
TE1_E08-01

- Utilizando o princípio de conservação de energia mecânica calcular o deslocamento que ocorre na ponta do balanço da viga esboçada.



$L1 := 6,0\ m$ $P1 := 150\ kN$

$L2 := 5,0\ m$

- Seção transversal retangular:

$b := 0,20\ m$ $h := 0,80\ m$

- Módulo e elasticidade e coef. de Poisson:

$E := 20 \cdot 10^{6}\ kN/m^2$ $\nu := 0,2$

Reações de Apoio:

ΣMc = 0 (+) horário

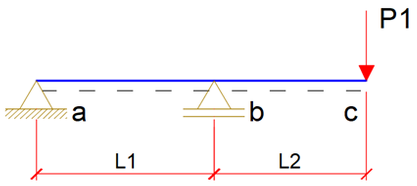
RVa.L1 + P1.L2 = 0 $RVa := \frac{1}{L1} \cdot (-P1 \cdot L2) = -125$

ΣFv = 0 (+) para cima

RVa + RVb - P1 = 0 $RVb := -RVa + P1 = 275$

Aplicação do PCEM:

$$P.\delta = \int_0^L \frac{N^2}{EA}dx + \int_0^L \frac{M^2}{EI}dx + \chi \int_0^L \frac{V^2}{GA}dx$$



$Mab(x) := RVa \cdot x = -125 \cdot x$

$Vab(x) := \frac{d}{dx} Mab(x) = -125$

$Mbc(x) := RVa \cdot x + RVb \cdot (x - L1) = (-125) \cdot x + 275 \cdot (x - 6)$

$Vbc(x) := \frac{d}{dx} Mbc(x) = 150$

$A := b \cdot h = 0,16$

$G := \frac{E}{2 \cdot (1 + \nu)} = 8,3333 \cdot 10^{6}$

$I := \frac{b \cdot h^3}{12} = 0,0085333$

$\chi := \frac{6}{5}$

$m1 := \int_0^{L1} \frac{Mab(x)^2}{E \cdot I} dx = 6,592$ $m2 := \int_{L1}^{L1+L2} \frac{Mbc(x)^2}{E \cdot I} dx = 5,493$

$v1 := \int_0^{L1} \chi \cdot \frac{Vab(x)^2}{G \cdot A} dx = 0,0844$ $v2 := \int_{L1}^{L1+L2} \chi \cdot \frac{Vbc(x)^2}{G \cdot A} dx = 0,1012$

$\delta total := \frac{1}{P1} \cdot (m1 + m2 + v1 + v2) = 0,081804$ $\delta mom := \frac{1}{P1} \cdot (m1 + m2) = 0,0806$

$\frac{\delta total}{\delta mom} = 1,0154$