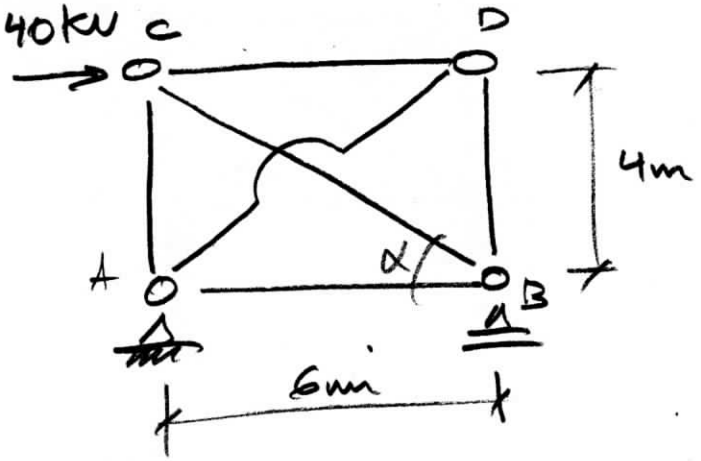
TE2-4.4

(1)

DETERMINAR OS ESFORÇOS NAS BARRAS DA TRELIÇA:



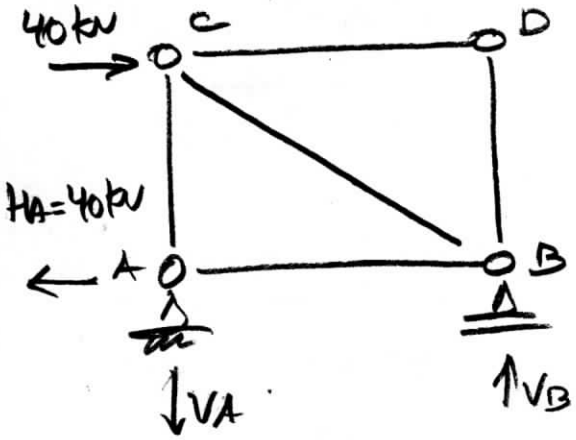
$$\bar{F}\cdot\delta = \sum_i \frac{\bar{N}_i N_i L_i}{AE}$$

$\sqrt{4^2+6^2} = 7{,}211$

$\cos\alpha = 6/7{,}211$

$\operatorname{sen}\alpha = 4/7{,}211$

CASO 0

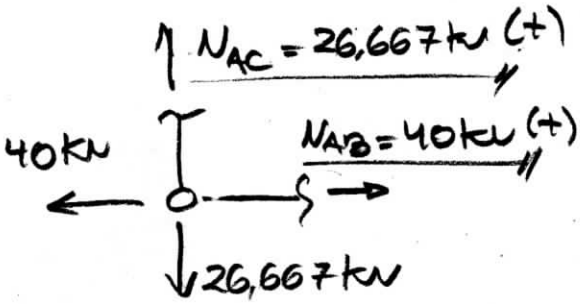


$\circlearrowleft^{+}\ \Sigma M_A = 0 \quad -V_B \times 6m + 40kN \times 4m = 0$

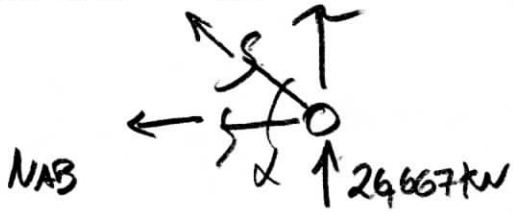
$V_B = \frac{1}{6}\cdot 160 = 26{,}667\ kN \uparrow$

$V_A = 26{,}667\ kN \downarrow$

NÓ A:



NÓ B:



$\rightarrow \Sigma F_H = 0 \quad -N_{AB} - N_{BC}\,6/7{,}211 = 0$

$N_{BC} = 7{,}211/6 \cdot -40 = \underline{48{,}073\ kN\ (-)}$

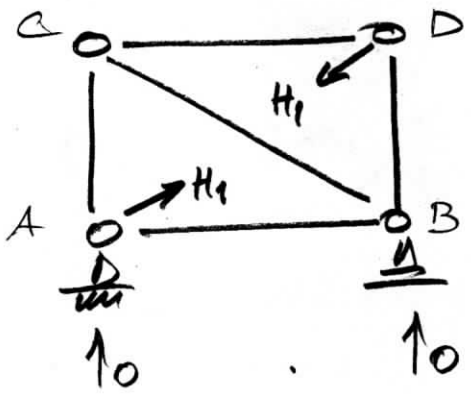
$\uparrow \Sigma F_V = 0$

$26{,}667\ kN + N_{BD} + 48{,}073 \times 4/7{,}211 = 0$

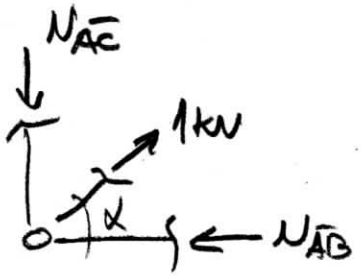
$N_{BD} = 48{,}073 \times \frac{4}{7{,}211} - 26{,}667 = \underline{0}$

LOGO $N_{CD} = \underline{0}$; TAMBÉM

CASO 1



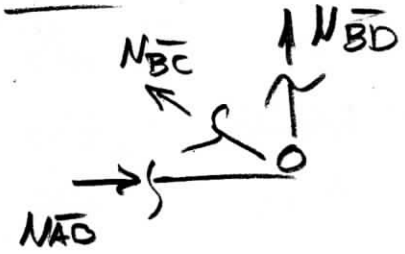
Nó A:



$N_{\bar{AC}} = \text{sen}\alpha = (-)0,5547\,kN$

$N_{\bar{AB}} = \cos\alpha = (-)0,8321\,kN$

Nó B:



$\vec{\Sigma F_H} = 0 \quad 0,8321 - N_{\bar{BC}}\cos\alpha = 0$

$N_{\bar{BC}} = 0,8321 / 6/7,211 = (+)1\,kN$

CASO 0	CASO 1
$N_{AC} = 26,667$	$N_{\bar{AC}} = -0,5547 = N_{\bar{BD}}$
$N_{AB} = 40$	$N_{\bar{AD}} = -0,8321 = N_{\bar{CD}}$
$N_{BC} = -48,073$	$N_{\bar{BC}} = +1,00$

$$\delta_{AD_0} = \frac{1}{EA}\left[26,667\times(-0,5547)\times 4m + 40\times(-0,8321)\times 6m - 48,073\times 1\times 7,211m\right] = -605,53/EA$$

$$\delta_{AD_1} = \frac{1}{EA}\left[(-0,5547)^2\times 4m\times 2 + (-0,8321)^2\times 6m\times 2 + 1^2\times 7,211m\right]$$

$$= 17,981/EA$$

$$\delta_{AD_0} + \delta_{AD_1} \times N_{AD} = -\frac{N_{AD} \cdot L_{AD}}{EA}$$ COND. DE COMPAT.

$$\delta_{AD_0} = N_{AD}\left(-\delta_{AD_1} - \frac{L_{AD}}{EA}\right)$$

$$N_{AD} = \delta_{AD_0} \Big/ \left(-\delta_{AD_1} - \frac{L_{AD}}{EA}\right)$$

$$N_{AD} = \frac{-605{,}53/EA}{-17{,}981/EA - 7{,}211/EA} = \frac{-605{,}53}{-25{,}192} = 24{,}036\,kN\,(+)$$

$$N = N_0 + N_{AD} \times N_1$$

$N_{AB} = 40 + 24{,}036 \times -0{,}8321 = 20\,kN\,(+)$

$N_{AC} = 26{,}667 + 24{,}036 \times -0{,}5547 = 13{,}333\,kN\,(+)$

$N_{BC} = -48{,}073 + 24{,}036 \times +1 = -24{,}036\,kN\,(-)$

$N_{BD} = 0 + 24{,}036 \times -0{,}5547 = 13{,}333\,kN\,(-)$

$N_{CD} = 0 + 24{,}036 \times -0{,}8321 = -20\,kN\,(-)$