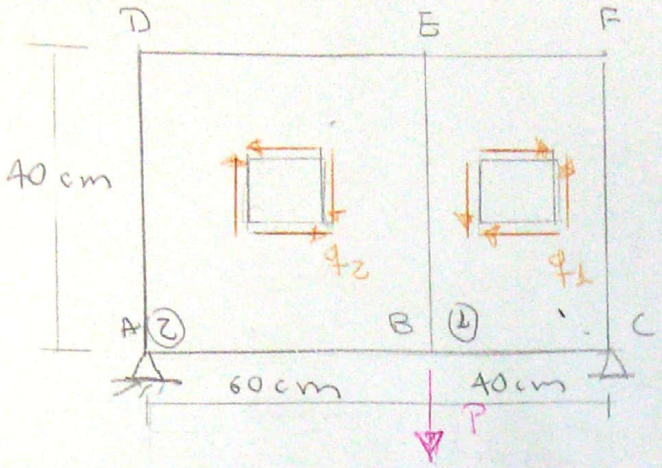
EXERCÍCIO - FLAMBAGEM

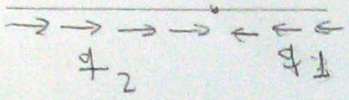


Determinar o máximo valor de P para que a chapa não sofra flambagem.

Dados: $E = 7000\ kN/cm^2$

$t = 0,2\ cm$

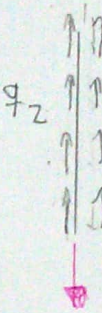
BARRA D-E-F



$$60\,q_2 - 40\,q_1 = 0$$

$$q_1 = 1,5\,q_2$$

BARRA E-B



$$-P + 40q_1 + 40q_2 = 0$$

$$-P + 40 \cdot 1,5\,q_2 - 40q_2 = 0$$

$$q_2 = \frac{P}{100}$$

$$q_1 = \frac{3P}{200}$$

Flambagem

→ Célula ②

$$\frac{a}{b} = \frac{40}{40} = 1 \Rightarrow k = 5,7$$

$$\sigma_{fo}^{①} = kE\left(\frac{t}{b}\right)^2$$

$$\sigma_{fo}^{①} = 5,7 \cdot 7000 \left(\frac{0,2}{40}\right)^2 = 0,9975$$

$$\sigma_{fo}^{①} = \frac{q_1}{t} = \frac{3P_{MÁX}^{①}}{200\,t}$$

$$0,9975 = \frac{3P_{MÁX}^{①}}{200 \cdot 0,2}$$

$$P_{MÁX}^{①} = 13,3\ kN$$

→ Célula ②

$$\frac{a}{b} = \frac{60}{40} = 1,5 \Rightarrow k = 4,2$$

$$\sigma_{fo}^{②} = kE\left(\frac{t}{b}\right)^2$$

$$\sigma_{fo}^{②} = 4,2 \cdot 7000 \left(\frac{0,2}{40}\right)^2 = 0,735$$

$$\sigma_{f_1}^{②} = \frac{q_2}{t} = \frac{P_{MÁX}^{②}}{100t}$$

$$0,735 = \frac{P_{MÁX}^{②}}{100 \cdot 0,2}$$

$$P_{MÁX}^{②} = 14,7\ kN$$

$$P_{CR} = \min\left\{P_{MÁX}^{①}, P_{MÁX}^{②}\right\} \Rightarrow \boxed{P_{CR} = 13,3\ kN}$$