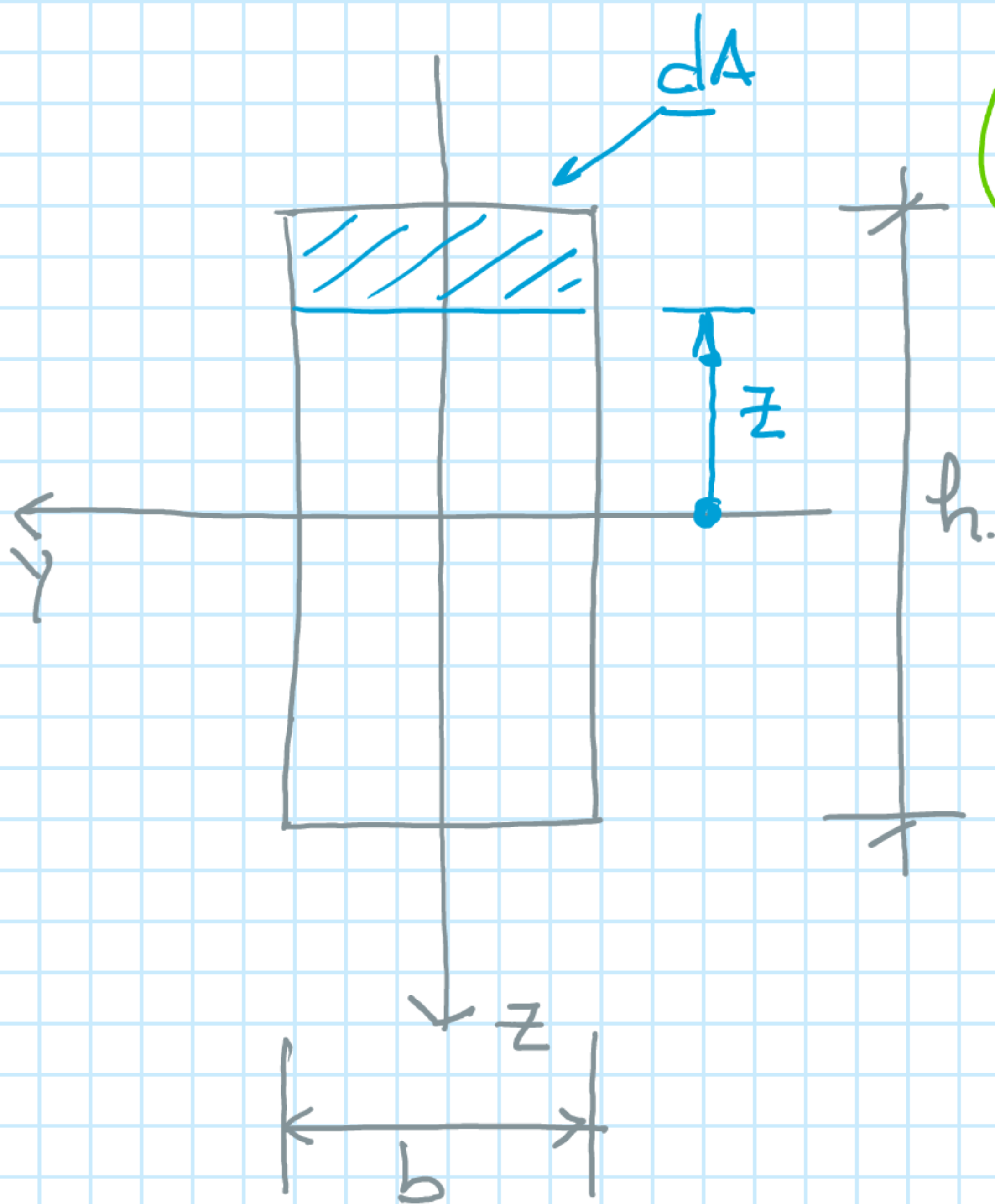


11 - DEFORMACIÓN CORTE:

martes, 15 de junio de 2021

10:14

APLICACIÓN A UNA SECCIÓN RECTANGULAR



$$dW = dC = \frac{Qz}{GA} \cdot k_y \cdot dx$$

$$k_y = \left[\int \frac{(S_N^*)^2}{I_N^4 \cdot b^2} \cdot \frac{dA}{A} \right]$$

$$dA = b \cdot \left(\frac{h}{2} - z \right) ; \quad z^* = z + \frac{1}{2} \left(\frac{h}{2} - z \right)$$

$$z^* = \frac{1}{2} \left(\frac{h}{2} + z \right)$$

$$S^* = b \cdot \left(\frac{h}{2} - z \right) \cdot z^* = b \left(\frac{h}{2} - z \right) \frac{1}{2} \left(\frac{h}{2} + z \right)$$

$$S^* = \frac{b}{2} \left(\frac{h^2}{4} - z^2 \right)$$

$$b = b ; \quad I_y = I_N = \frac{bh^3}{12} ; \quad A = bh$$

$$\frac{I_y}{A} = \frac{bh^3}{12bh} = \frac{h^2}{12} = r_y^2 = r_N^2$$

$$r_y^4 = \frac{h^4}{144}$$

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$$K_y = \int \frac{(S_z^*)^2}{I_z \cdot b^2} \cdot \frac{dA}{A} = \int \left(\frac{b}{2} \right)^2 \frac{(h^2/4 - z^2)^2}{\frac{h^4}{144} \cdot b^2} \frac{dA}{bh} =$$

$$\frac{h^2}{4} - z^2 = \frac{h^2}{4} \left[1 - \left(\frac{2z}{h} \right)^2 \right] = \frac{h^2}{4} \left[1 - \frac{4z^2}{h^2} \right]$$

$$K_y = \int \frac{\cancel{b^2}}{4} \frac{\cancel{144}}{\cancel{h^4}} \frac{1}{\cancel{b^2}} \frac{(\cancel{h^2})^2}{\cancel{4^2}} \left[1 - \frac{4z^2}{h^2} \right]^2 \frac{\cancel{b} dz}{\cancel{bh}}$$

$$K_y = \int_{-h/2}^{+h/2} \frac{9}{4h} \left[1 - \frac{4z^2}{h^2} \right]^2 dz = \frac{9}{4h} \int_{-h/2}^{+h/2} \left[1 - \frac{4z^2}{h^2} \right]^2 dz$$

$$K_y = \frac{9}{4h} \int_{-h/2}^{+h/2} \left(1 + \frac{16z^4}{h^4} - \frac{8z^2}{h^2} \right) dz$$

$$K_y = \frac{9}{4h} \left[z + \frac{16}{5} \frac{z^5}{h^4} - \frac{8}{3} \frac{z^3}{h^2} \right]_{-h/2}^{+h/2}$$

$$K_y = \frac{6}{5}$$

$$dw = dc = \frac{K_y \cdot Q_z(x)}{G \cdot A} \cdot dx$$

$$dw = dc = \frac{Q_z(x)}{G \cdot A_y} \cdot dx$$

$$dw = dc = \frac{Q_z(x)}{G \cdot \frac{A}{K_y} A_y} \cdot dx$$

$$A_y = \frac{A}{K_y} = \frac{5}{6} A$$