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ANALISIS DE ESTRUCTURAS

CÁLCULO DEL ACERO DE REFUERZO DE UNA VIGA RECTANGULAR

5° CUATRIMESTRE

LAR-ARQUITECTURA "A"

COMITAN DE DOMINGUEZ, CHIAPAS A 10 FEBRERO 2022

Analysis de estructuras

Cálculo del acero de refuerzo de una viga rectangular

$$*F_c = 0.8 f_c$$

$${}^{\prime\prime}F_c = 0.85 f_c \rightarrow \text{Concreto} \leq 250 \text{ kg/cm}^2$$

$$R_o = \frac{F_c}{F_y} \cdot \frac{4,800}{F_y + 6,000}$$

$$P_{min} = \frac{0.7 \sqrt{F_c}}{F_y}$$

$$P_{max} = 0.75 p_b$$

Concreto F_c 200 kg/cm²

Acero $F_y = 4,200 \text{ kg/cm}^2$

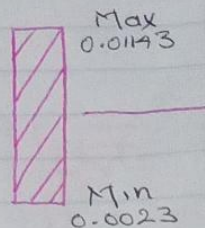
$$*F_c = 0.8 f_c \rightarrow 0.8 (200 \text{ kg/cm}^2) = 160 \text{ kg/cm}^2$$

$${}^{\prime\prime}F_c = 0.85 f_c \rightarrow 0.85 (160 \text{ kg/cm}^2) = 136 \text{ kg/cm}^2$$

$$R_o = \frac{136 \text{ kg/cm}^2}{4,200 \text{ kg/cm}^2} \cdot \frac{4,800}{4,200 + 6,000} = 0.0151$$

$$P_{min} = \frac{0.70 \sqrt{200 \text{ kg/cm}^2}}{4,200 \text{ kg/cm}^2} = 0.002357$$

$$P_{max} = (0.75) 0.01524 = 0.01143$$



$$FR = \text{Factor} = 0.90$$

$$d = \text{peralte efectivo} = h - r$$

$$b = \text{base supuesta}$$

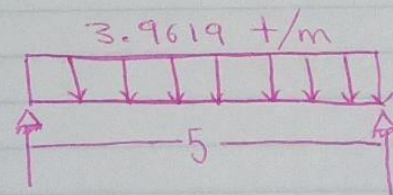
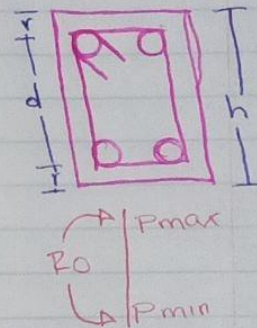
$$h = \text{altura de trabe}$$

$$r = \text{recubrimiento} = 4 \text{ cm}$$

$$P = \frac{(-q^2 + 1) \cdot F_c}{F_y}$$

$$q^2 = - \frac{M_u}{FR \cdot b \cdot d^2 \cdot F_c} \cdot 2 + 1$$

$$q = \sqrt{- \frac{M_u}{FR \cdot b \cdot d^2 \cdot F_c} \cdot 2 + 1}$$



DATOS

$$b = 15 \text{ cm}$$

$$h = 45 \text{ cm} = 60$$

$$d = 41 \text{ cm} = 56$$

$$M_u = 1609517 \text{ kg/cm}^2$$

$$F_y = 4200 \text{ kg/cm}^2$$

$$F_c = 200 \text{ kg/cm}^2$$

$$q = 0.2073$$

$$M = \frac{w \cdot L^2}{8}$$

$$M = \frac{3.9619 \text{ t/m} (5 \text{ m})^2}{8}$$

$$M = 12.3809 \text{ t} \cdot \text{m}$$

$$* 1,000 \times 100 = 100,000$$

$$100,000 \times 12.3809 = 1,238,090 \text{ kg/m}$$

$$1,238,090 \times 1.3 = 1,609,517 \text{ kg/m}$$

$$q = \frac{-1,609,517}{\sqrt{0.90 \cdot 15 \cdot 50^2 \cdot 136}} \cdot 2 + 1$$

$$q = \frac{1,609,517}{5,757,696} = 0.2795$$

$$= 0.2795 (2) = 0.559 = -0.559 + 1$$

$$= 0.441 = \sqrt{0.441} = \underline{0.6640}$$

$$P = \frac{(-0.6640 + 1) 136}{4,200} = \underline{0.01088}$$

