Licence Génie Civil
Projet de Fin de Cycle
Chargée du Module : D. RIZI

TD Les Planchers : Ferraillage

Exercice 1 : Soit un panneau isolé en dalle pleine.

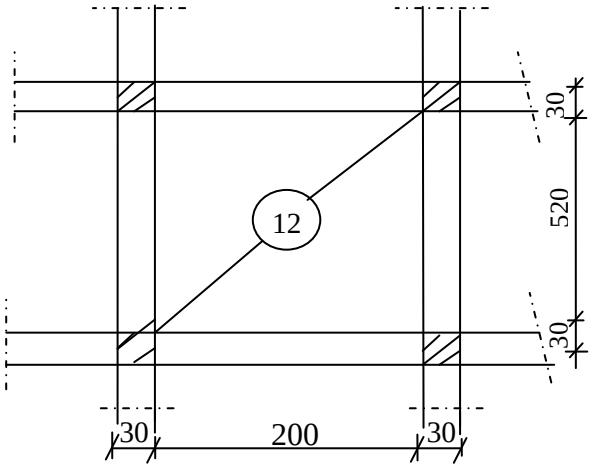
Q = 150 kgf/m²

G = 454 kgf/m²

1- Calculer (M) et (T) à (l'E.L.U) et à (l'E.L.S) ?

2- Disposer convenablement les armatures.

(Le ferraillage est supposé choisi)



Solution :

$\rho = \frac{lx}{ly} = \frac{2}{5,2} = 0,38 < 0,4 \rightarrow$ dalle portant dans 1 seul sens.

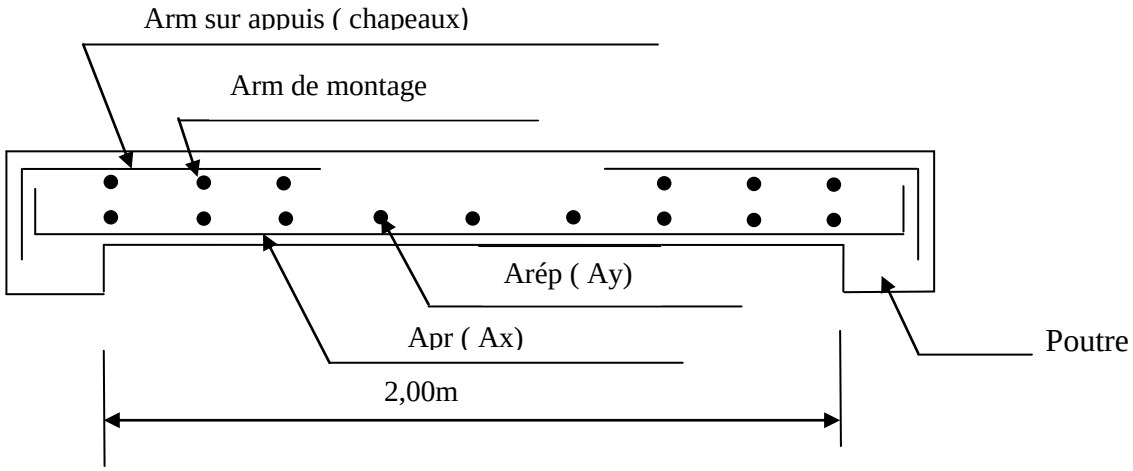
- **E.L.U**

$q_u = 1,35\ (0,454) + 1,5\ (0,15) = 0,838$ tf/m²

$$\begin{cases} M_o = q_u \cdot \frac{lx^2}{8} = 0,838 \cdot \frac{4}{8} = 0,419 \text{ tf.m} \\ M_t = 0,8 \cdot M_o = 0,8\ (0,419) = 0,335 \text{ tf.m} \\ M_a = -0,50 \cdot Mo = -0,50\ (0,419) = -0,209 \text{ tf.m} \\ T = q_u \cdot \frac{lx}{2} = 0,838 \cdot \frac{2}{2} = 0,838 \text{ tf.} \end{cases}$$

- **E.L.S** $q_{ser} = 0,454 + 0,15 = 0,604$ tf/m²

$$\begin{cases} M_o = 0,604 \cdot \frac{4}{8} = 0,302 \text{ tf.m} \\ M_t = 0,8 \cdot (0,302) = 0,2416 \text{ tf.} \\ M_a = -0,5\ .(0,302) = -0,151 \text{ tf.m} \end{cases}$$



Exercice 2 :

On conserve les mêmes données et les mêmes questions en prenant $l_x = 3{,}90$m?

Solution :

1) Plancher à surcharge d'exploitation modérée.

$\boldsymbol{\rho} = \frac{lx}{ly} = \frac{3.9}{5.2} = 0{,}75 > 0{,}4 \rightarrow$ la dalle porte dans deux sens.

E.L.U : $q_u = 0{,}838$ tf/m²

$\nu = 0$, $\boldsymbol{\rho} = 0{,}75$ } tab → $\mu_x = 0{,}0621$, $\mu_y = 0{,}5105$

$$\begin{cases} M_{ox} = \mu_x \cdot q_u \cdot (l_x)^2 = 0{,}0621 \cdot (0{,}838) \cdot (3{,}9)^2 = 0{,}7915 \text{ tf.m} \\ M_{tx} = 0{,}75 \cdot M_{ox} = 0{,}75 \cdot (0{,}7915) = 0{,}594 \text{ tf.m} \\ M_{ax} = -0{,}50 \cdot M_{ox} = -0{,}50\ (0{,}7915) = -0{,}396 \text{ tf.m} \end{cases}$$

$$\begin{cases} M_{oy} = \mu_y \cdot (M_{ox}) = 0{,}5105 \cdot (0{,}7915) = 0{,}404 \text{ tf.m} \\ M_{ty} = 0{,}75 \cdot (M_{oy}) = 0{,}75 \cdot (0{,}404) = 0{,}303 \text{ tf.m} \\ M_{ay} = -0{,}50 \cdot (M_{oy}) = -0{,}50\ (0{,}404) = -0{,}202 \text{ tf.m} \end{cases}$$

$$\begin{cases} T_x = q_u \cdot \frac{lx}{2+\rho} = 0{,}838 \cdot \frac{3.9}{2+0{,}75} = 1{,}19 \text{ tf} \\ T_y = q_u \cdot \frac{lx}{3} = 0{,}838 \cdot \frac{3.9}{3} = 1{,}09 \text{ tf} \end{cases}$$

E.L.S : $q_{ser} = 0{,}604$ tf/m²

$\nu = 0{,}2$, $\boldsymbol{\rho} = 0{,}75$ } tab → $\mu_x = 0{,}0684$, $\mu_y = 0{,}6447$

$$\begin{cases} M_{0x} = \mu_x \cdot q_{ser} \cdot (l_x)^2 = 0{,}0684 \cdot (0{,}604) \cdot (3{,}9)^2 = 0{,}628 \text{ tf.m} \\ M_{tx} = 0{,}75 \cdot M_{ox} = 0{,}75 \cdot (0{,}628) = 0{,}471 \text{ tf.m} \\ M_{ax} = -0{,}50 \cdot M_{ox} = -0{,}50\ (0{,}628) = -0{,}314 \text{ tf.m} \end{cases}$$

$$\begin{cases} M_{oy} = \mu_y \cdot (M_{ox}) = 0{,}6447 \cdot (0{,}628) = 0{,}405 \text{ tf.m} \\ M_{tx} = 0{,}75 \cdot (M_{oy}) = 0{,}75 \cdot (0{,}405) = 0{,}304 \text{ tf.m} \\ M_{ax} = -0{,}50 \cdot (M_{oy}) = -0{,}50\ (0{,}405) = -0{,}2025 \text{ tf.m} \end{cases}$$

2) **<u>Schéma de ferraillage</u>** :