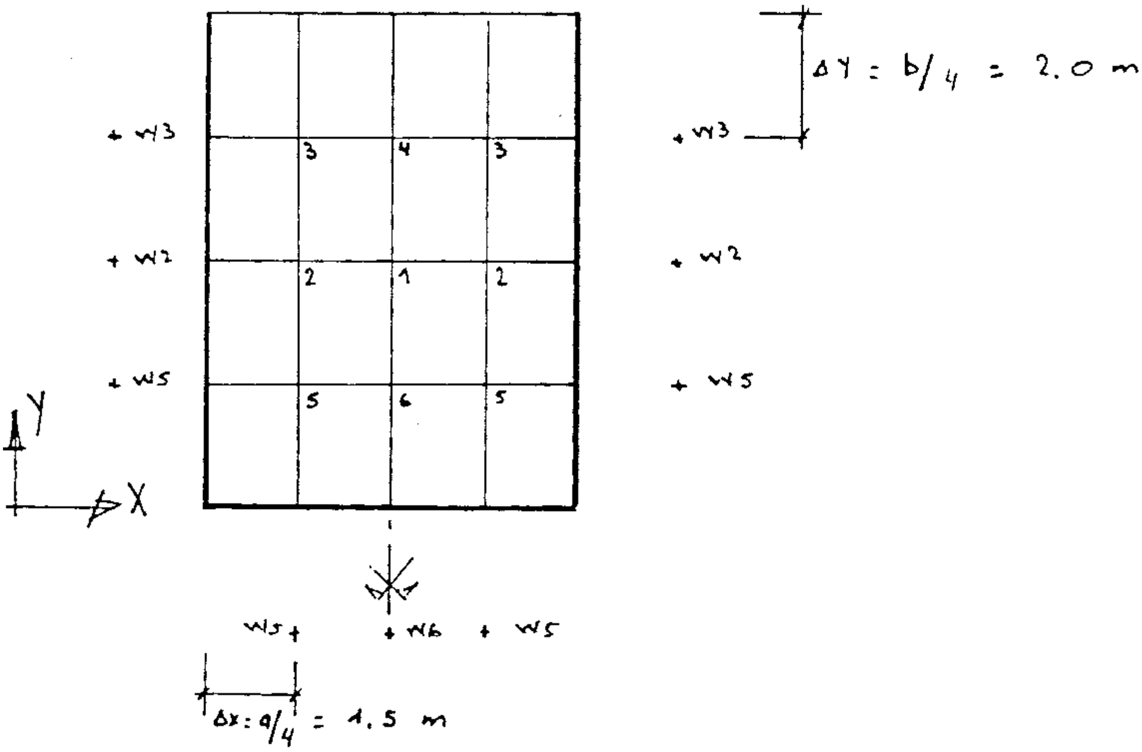


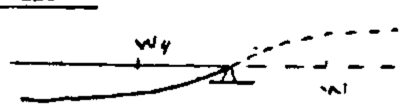
$$\frac{\partial^4 w}{\partial x^4} + 2\frac{\partial^4 w}{\partial x^2 \partial y^2} + \frac{\partial^4 w}{\partial y^4} = P/B$$

<u>Encastrement</u>

$$\frac{\partial w}{\partial x} = 0 \Rightarrow \frac{1}{2\Delta x}\left[-w_2 + w\right] = 0$$

$$\Rightarrow \quad w_2 = w$$

<u>Appui</u>



$$\frac{\partial^2 w}{\partial y^2} = 0 \Rightarrow \frac{1}{\Delta y^2}\left[w_4 + w\right] = 0$$

$$\Rightarrow \quad w = -w_4$$

– Equations aux différences finies –

Point 1

$$\frac{1}{\Delta x^4}\left[-4w_2+6w_1-4w_2\right]+\frac{2}{\Delta x^2\Delta y^2}\left[w_3-2w_4+w_3-2w_2+w_5-2w_6+w_5-2w_2+4w_1\right]+\frac{1}{\Delta y^4}\left[-4w_4+6w_1-4w_6\right]=\frac{P}{B}$$

$\Delta y = c\,\Delta x$ avec $c = 1{,}333$

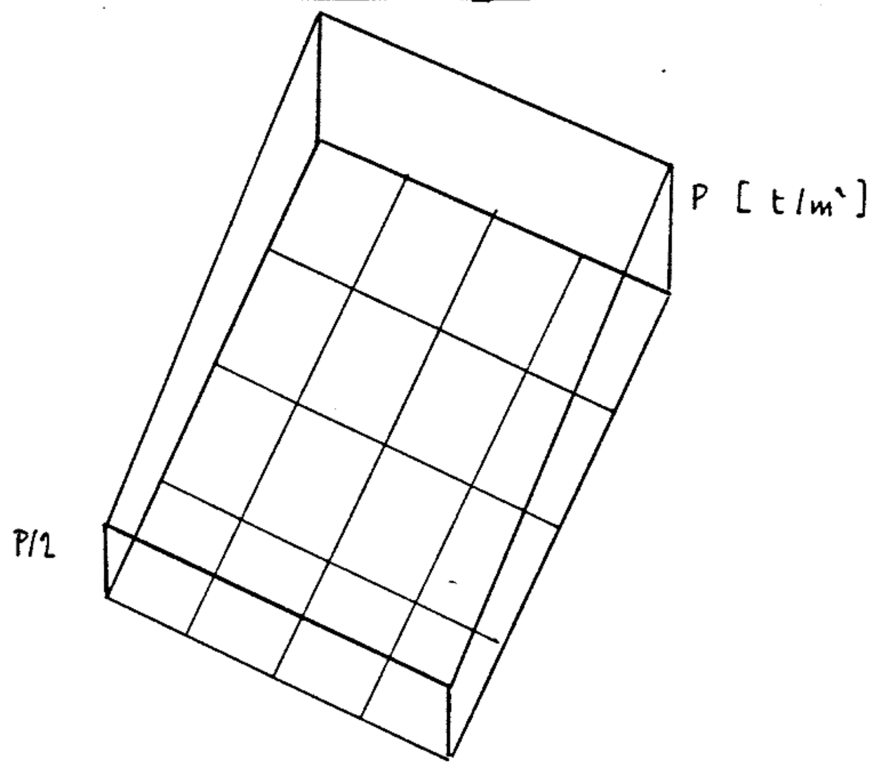
$$w_1\left[6c^4+8c^2+6\right]+w_2\left[-8c^4-8c^2\right]+w_3\left[4c^2\right]+w_4\left[-4c^2-4\right]+w_5\left[4c^2\right]+w_6\left[-4c^2-4\right]=\frac{P a^4 c^4}{256\,B}$$

on arrive à la matrice suivante

$$\begin{bmatrix} 6c^4+8c^2+6 & -8c^4-8c^2 & 4c^2 & -4c^2-4 & 4c^2 & -4c^2-4 \\ -4c^4-4c^2 & 8c^4+8c^2+6 & -4c^2-4 & 2c^2 & -4c^2-4 & 2c^2 \\ 2c^2 & -4c^2-4 & 8c^4+8c^2+5 & -4c^4-4c^2 & 1 & 0 \\ -4c^2-4 & 4c^2 & -8c^4-8c^2 & 6c^4+8c^2+5 & 0 & 1 \\ 2c^2 & -4c^2-4 & 1 & 0 & 8c^4+8c^2+7 & -4c^4-4c^2 \\ -4c^2-4 & 4c^2 & 0 & 1 & -8c^4-8c^2 & 6c^4+8c^2+7 \end{bmatrix}[w]=[P]$$

$$[w]=\begin{bmatrix} w_1 \\ w_2 \\ w_3 \\ w_4 \\ w_5 \\ w_6 \end{bmatrix}$$

Calcul du terme de charge :



$P_1 = 3P/4$ $P_2 = 3P/4$ $P_3 = 7P/8$

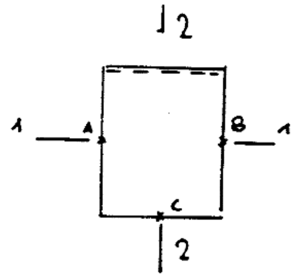
$P_4 = 7P/8$ $P_5 = 5P/8$ $P_6 = 5P/8$

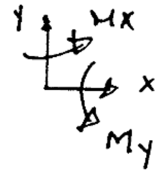
Avec $c = 4/3$ on arrive :

$$W = \frac{1}{B}\begin{bmatrix} 2.92 \\ 1.88 \\ 1.64 \\ 2.52 \\ 1.18 \\ 1.82 \end{bmatrix} \Rightarrow w_1 = \frac{2.92}{B} = 0{,}00225\,\frac{qa^4}{B}$$

La théorie donne pour $w_1 = \frac{3.0}{B} = 0.0023\,\frac{qa^4}{B}$

calcul de Mx selon 1.1





$$Mx_A = -B\left[\frac{\partial^2 w}{\partial x^2} + \nu \frac{\partial^2 w}{\partial y^2}\right] \qquad \nu = 0{,}15$$

$$Mx_A = -B\left[\frac{1}{\Delta x^2}(w_2 - 0 + w_2) + \frac{\nu}{\Delta y^2}(0)\right] = -1{,}67 \ t.m/m'$$

$$Mx_2 = -B\left[\frac{1}{\Delta x^2}(0 - 2w_2 + w_1) + \frac{\nu}{\Delta y^2}(w_3 - 2w_2 + w_5)\right] = 0{,}41 \ t.m/m$$

$$Mx_1 = -B\left[\frac{1}{\Delta x^2}(+2w_2 - 2w_1) + \frac{\nu}{\Delta y^2}(w_4 - 2w_1 + w_C)\right] = 0{,}98 \ t.m/m'$$

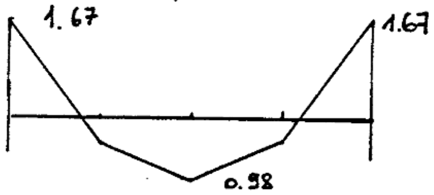
calcul de MY selon 2.2

$$My_C = -B\left[\frac{1}{\Delta y^2}[w_6 - 0 + w_6] + \frac{\nu}{\Delta x^2}\, 0\right] = -0{,}91 \ t.m/m'$$

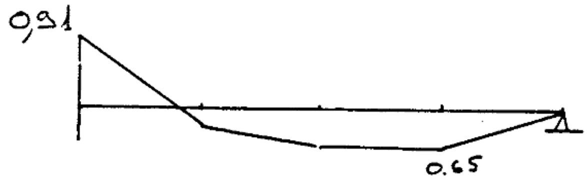
$$My_6 = -B\left[\frac{1}{\Delta y^2}[w_1 - 2w_6] + \frac{\nu}{\Delta x^2}[2w_5 - 2w_6]\right] = +0{,}26 \ t.m/m'$$

$$My_1 = -B\left[\frac{1}{\Delta y^2}(w_4 + w_6 - 2w_1) + \frac{\nu}{\Delta x^2}[2w_2 - 2w_1]\right] = 0{,}52 \ t.m/m'$$

$$My_4 = -B\left[\frac{1}{\Delta y^2}(-2w_4 + w_1) + \frac{\nu}{\Delta x^2}(2w_3 - 2w_4)\right] = 0{,}65 \ t.m/m'$$



Mx – COUPE 1.1



MY – COUPE 2.2 –