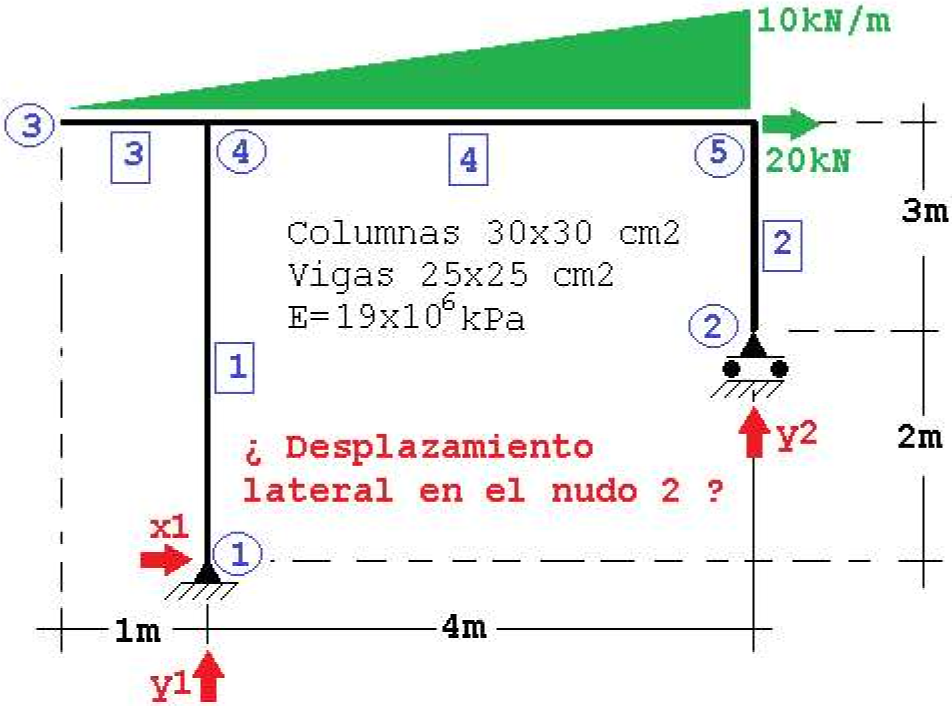


$$\left[Ic := \frac{0.3^4}{12},\ Iv := \frac{0.25^4}{12},\ E := 19 \cdot 10^6,\ x1 :=,\ y1 :=,\ y2 := \right]$$

Ecuaciones de la estática para encontrar las reacciones

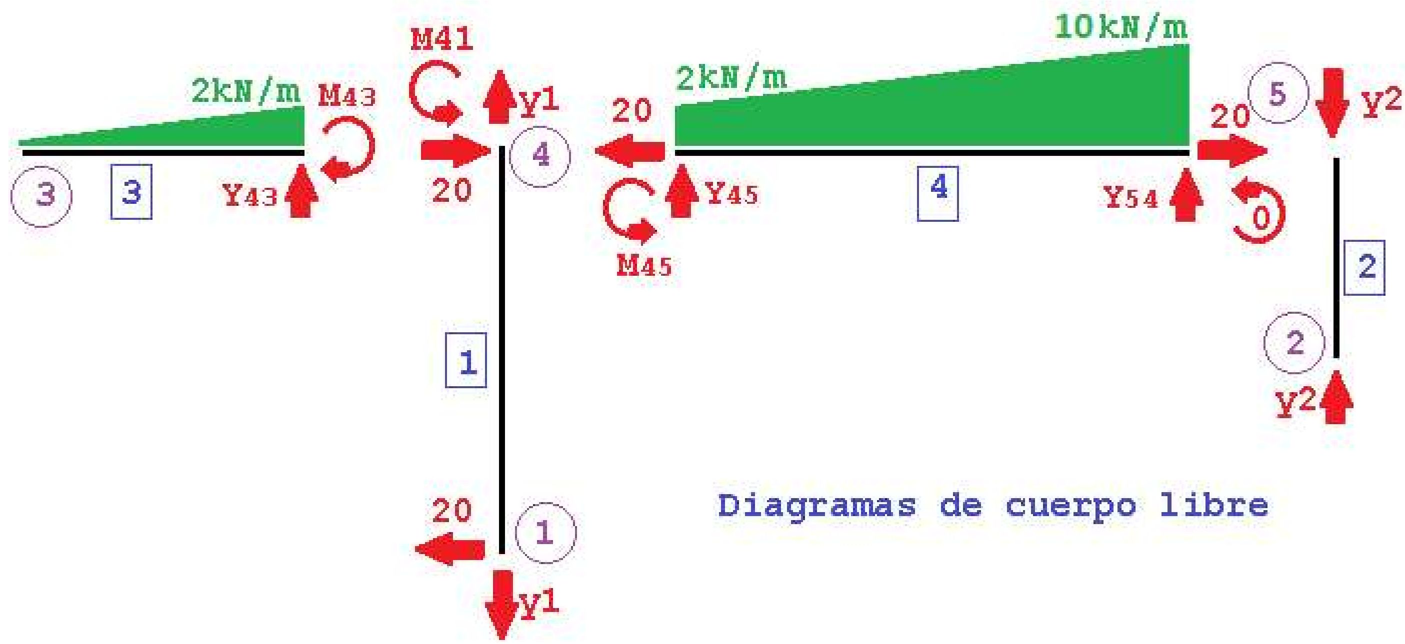
$$x1 = -20$$

$$y1 + y2 = \frac{10 \cdot 5}{2}$$

$$y2 \cdot 4 - 20 \cdot 5 - \frac{10 \cdot 5}{2} \cdot \left(\frac{2}{3} \cdot 5 - 1 \right) = 0$$

$$\left[x1 := -20,\ y1 := -\frac{175}{12},\ y2 := \frac{475}{12} \right]$$

$$[x1 := -20,\ y1 := -14.58333333,\ y2 := 39.58333333]$$



Elemento 3

$$\left[y43 := \frac{2 \cdot 1}{2}, \ M43 := \frac{2 \cdot 1}{2} \cdot \frac{1}{3}\right]$$

$$\left[y43 := 1, \ M43 := \frac{1}{3}\right]$$

Elemento 1

$M41 := 20 \cdot 5$

$$M41 := 100$$

Nudo 4

$-M43 + M41 + M45 = 0$

$$\frac{1}{3} + 100 + M45 = 0$$

$$M45 = -\frac{299}{3}$$

$$M45 = -99.66666666$$

Elemento 4

$$y45 + y54 = \frac{2 + 10}{2} \cdot 4$$

$$y45 + y54 = 24$$

$$y54 \cdot 4 + M45 - \frac{(10-2)\cdot 4}{2}\cdot\frac{2}{3}\cdot 4 - 2\cdot 4\cdot 2 = 0$$

$$y54 \cdot 4 + -\frac{299}{3} - \frac{(10-2)\cdot 4}{2}\cdot\frac{2}{3}\cdot 4 - 2\cdot 4\cdot 2 = 0$$

$$y54 = \frac{475}{12}$$

$$y54 = 39.58333333$$

Lo anterior chequea para sumatoria de fuerzas en nudo 5

$$y45 + \frac{475}{12} = \frac{2+10}{2}\cdot 4$$

$$y45 = -\frac{187}{12}$$

$$y45 = -15.58333333$$

Chequeo de sumatoria de fuerzas en nudo 4:

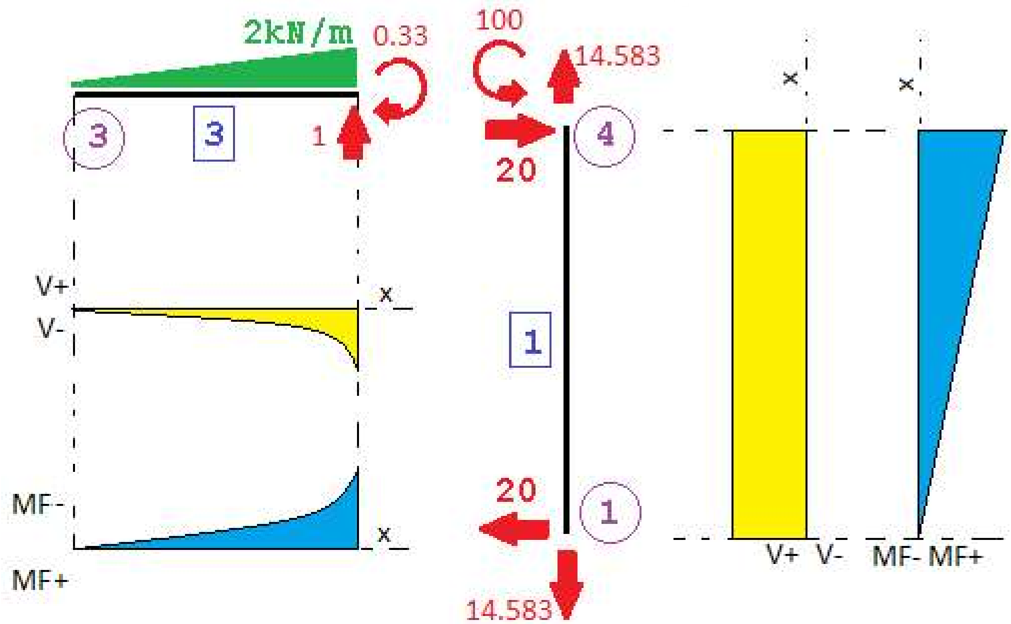
$$-y1 + y43 + y45$$

$$\frac{175}{12} + 1 + -\frac{187}{12}$$

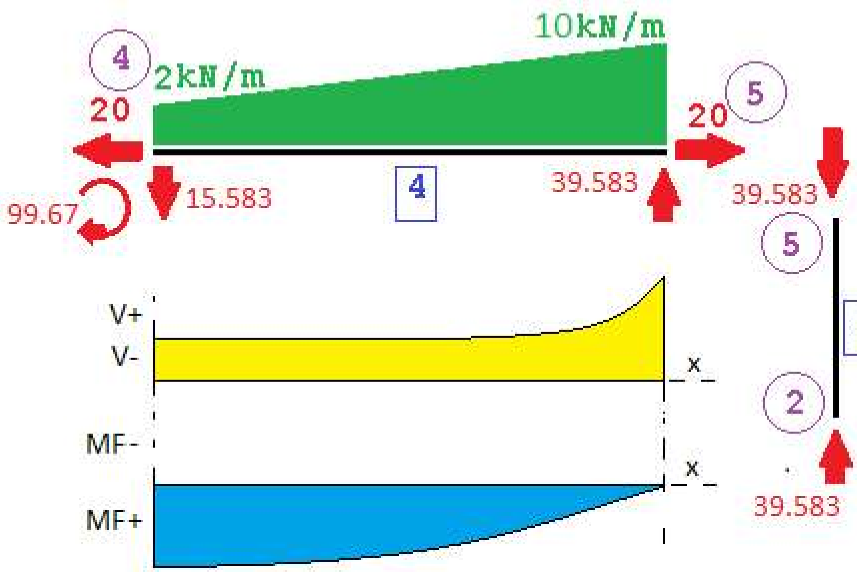
$$0$$

Tambien chequea la sumatoria de fuerzas en el nudo 4

Los diagramas serán los siguientes:



Diagramas de Fuerza Cortante y Momento Flector



Diagramas de Fuerza Cortante y Momento Flector

$$\left[V1(x) := 20,\ V2(x) := 0,\ V3(x) := -x^{2},\ V4(x) := -\frac{187}{12} - \frac{2 + (2 + 2\cdot x)}{2}\cdot x \right]$$

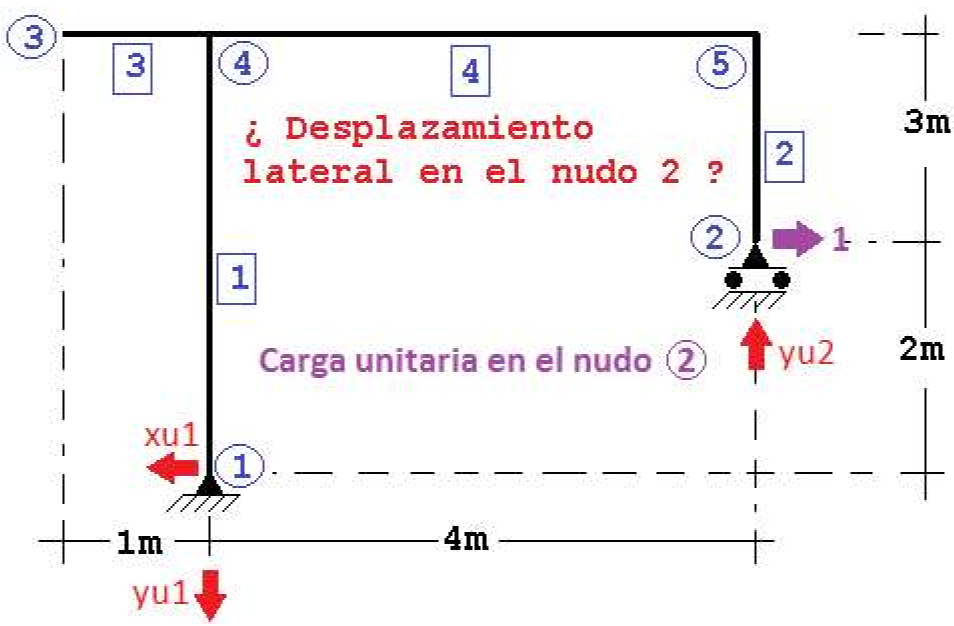
$$\left[V1(x) := 20,\ V2(x) := 0,\ V3(x) := -x^{2},\ V4(x) := -\frac{12\cdot x^{2} + 24\cdot x + 187}{12} \right]$$

$$\left[M1(x) := 20\cdot x,\ M2(x) := 0,\ M3(x) := -\frac{x^{3}}{3},\ M4(x) := +\frac{299}{3} - \frac{187}{12}\cdot x - \right.$$

(2) (3 2 + 2·x + 2))]

$$\left[M1(x) := 20\cdot x,\ M2(x) := 0,\ M3(x) := -\frac{x^3}{3},\ M4(x) := -\frac{4\cdot x^3 + 12\cdot x^2 + 187\cdot x - 1196}{12}\right]$$

Encontrar el desplazamiento del nudo 2, que inicialmente se supone a la derecha:



$$xu1 = 1$$

$$-yu1 + yu2 = 0$$

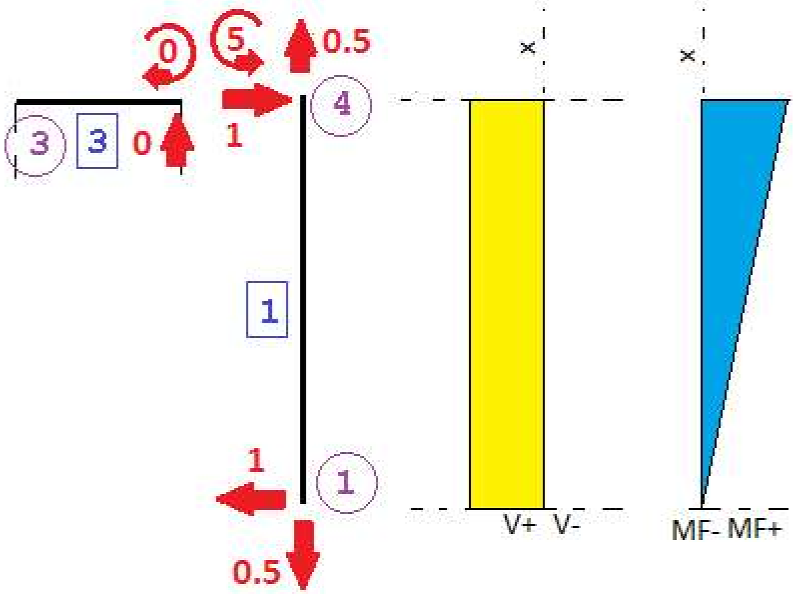
$$yu2\cdot 4 - 1\cdot 2 = 0$$

$$yu2 = \frac{1}{2}$$

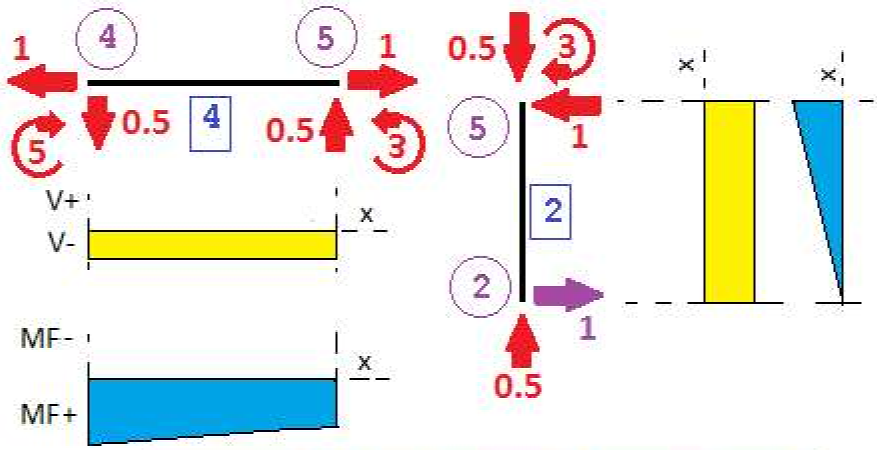
$$-yu1 + \frac{1}{2} = 0$$

$$yu1 = \frac{1}{2}$$

Encuentro los momentos flectores de la estructura cargada con la carga unitaria ficticia



Diagramas de Fuerza Cortante y Momento Flector



Diagramas de Fuerza Cortante y Momento Flector

$[m1(x) := x,\ m2(x) := -x,\ m3(x) := 0,\ m4(x) := 5 - 0.5\cdot x]$

Aplico el teorema del método de la carga unitaria ficticia

$$\frac{1}{E\cdot Ic}\cdot\left(\int_0^5 M1(x)\cdot m1(x)\,dx+\int_0^3 M2(x)\cdot m2(x)\,dx\right)+\frac{1}{E\cdot Iv}\cdot\left(\int_0^1 M3(x)\cdot m3(x)\,dx+\int_0^4 M4(x)\cdot m4(x)\,dx\right)$$

$$\frac{1}{E\cdot Ic}\cdot\left(\int_0^5 (20\cdot x)\cdot x\,dx + \int_0^3 0\cdot(-x)\,dx\right) + \frac{1}{E\cdot Iv}\cdot\left(\int_0^1 \left(-\frac{x^3}{3}\right)\cdot 0\,dx + \int_0^4 \left(-\frac{4\cdot x^3 + 12\cdot x^2 + 187\cdot x - 1196}{12}\right)\cdot\left(5 - \frac{x}{2}\right)\,dx\right)$$

$$\frac{1}{E\cdot Ic}\cdot\left(\frac{2500}{3} + 0\right) + \frac{1}{E\cdot Iv}\cdot\left(0 + \frac{44566}{45}\right)$$

$$\frac{1}{E\cdot Ic}\cdot\frac{2500}{3} + \frac{1}{E\cdot Iv}\cdot\frac{44566}{45}$$

$$\frac{1}{12825}\cdot\frac{2500}{3} + \frac{48}{296875}\cdot\frac{44566}{45}$$

$$\frac{100}{1539} + \frac{713056}{4453125}$$

$$0.2251021141$$

Desplazamiento del nudo 2 hacia la derecha = 22.5 cm