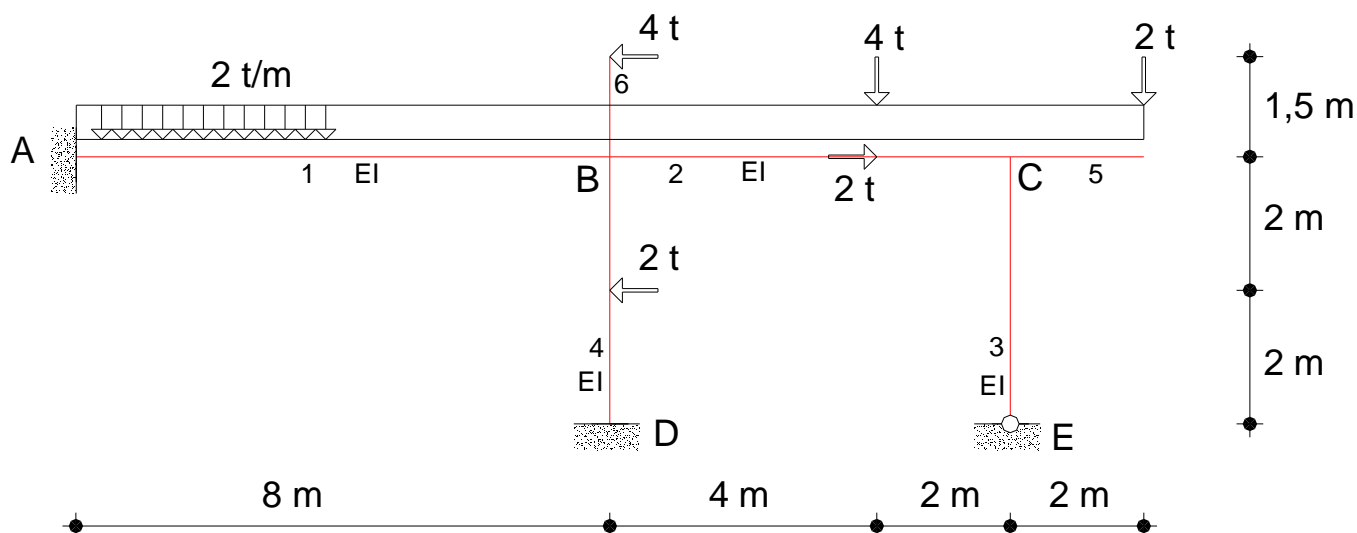
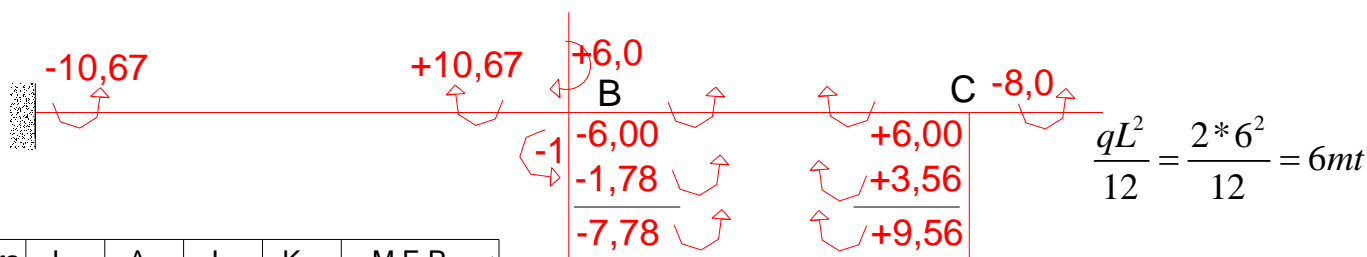


### Ejercicio nº 3. Pórtico intraslacional (Cross)



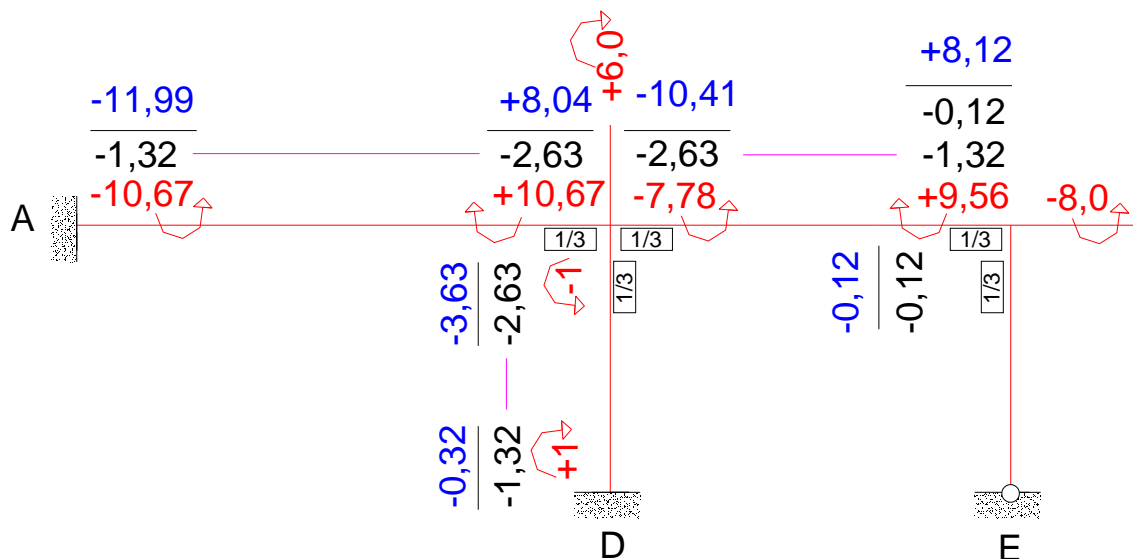
**ETAPA I:** M.E.P. y factores de reparto.  $\frac{qL^2}{12} = \frac{2 \cdot 8^2}{12} = 10,67 \text{ mt}$      $\frac{-Pab^2}{L^2} = \frac{4 \cdot 4 \cdot 2^2}{6^2} = -1,78 \text{ mt}$



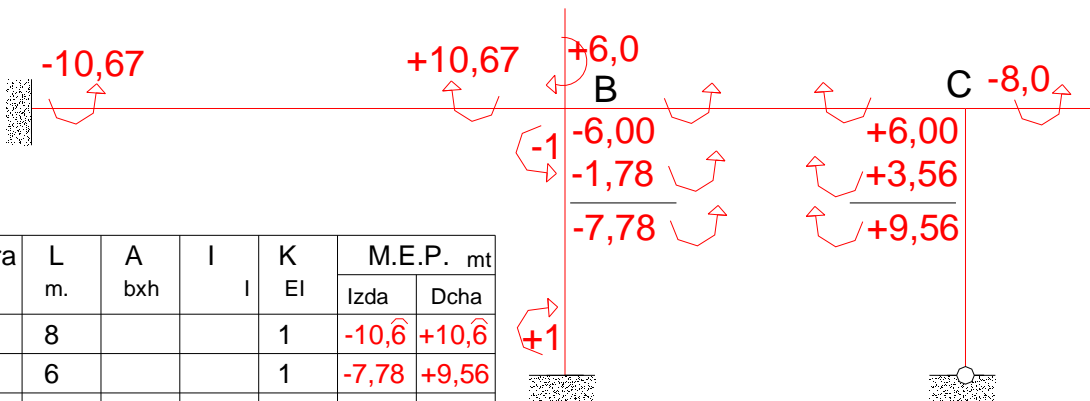
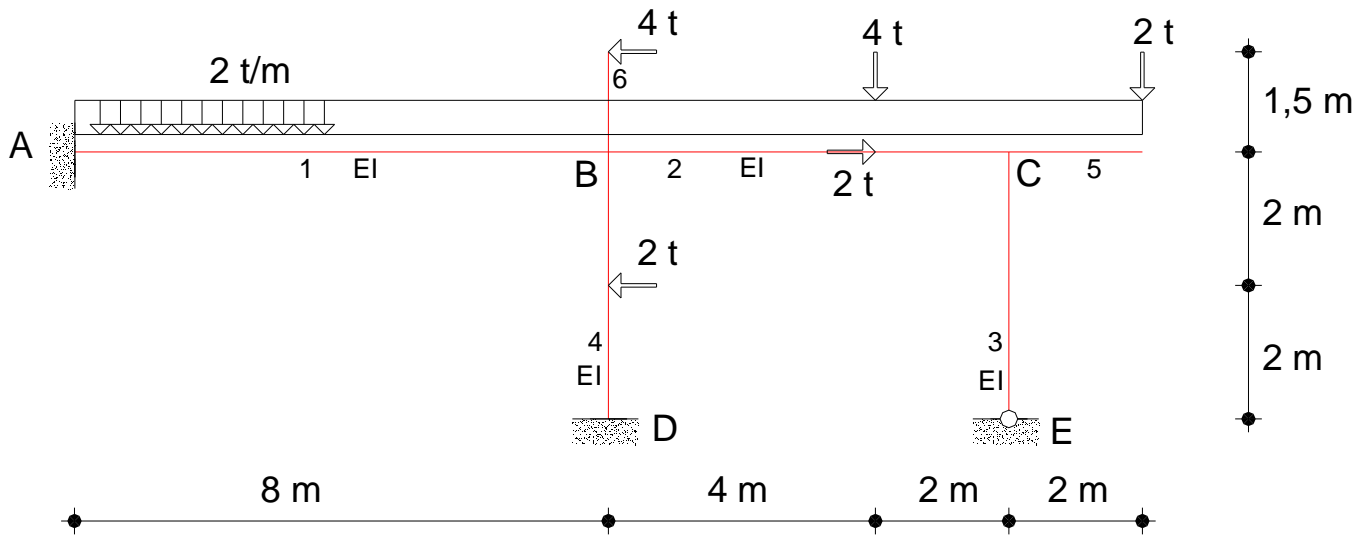
Barra nº	L m.	A b x h	I	K EI	M.E.P. mt	
					lzda	Dcha
1	8			1	-10,6	+10,6
2	6			1	-7,78	+9,56
3	4			1		
4	4			1	+1	-1

$$\frac{Pa^2b}{L^2} = \frac{4 \cdot 4^2 \cdot 2}{6^2} = 3,56 \text{ mt}$$

**ETAPA II:** Equilibrio de nudos. Se liberan los nudos uno a uno, se equilibra y transmite en su caso.



### Ejemplo n° 3: estructura intraslacional. (matricial)

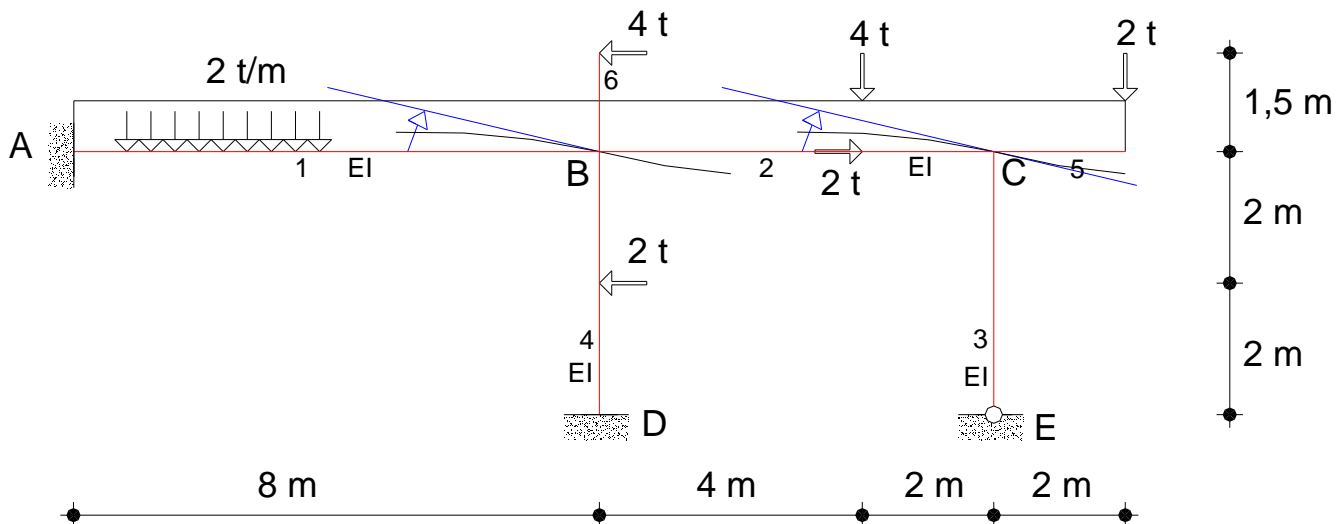


Barra n°	L m.	A b x h	I	K EI	M.E.P. mt	
					Izda	Dcha
1	8			1	-10,6	+10,6
2	6			1	-7,78	+9,56
3	4			1		
4	4			1	+1	-1

#### Método Matricial.

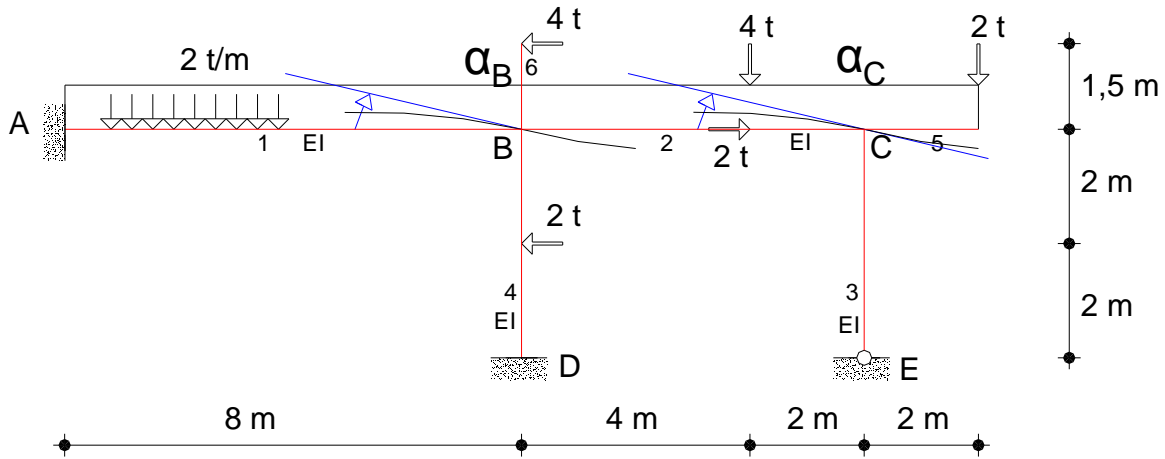
Dos nudos sin desplazamientos. Grado hiperestático por el método de los desplazamientos = 2.  
 .Las incógnitas son: " $\alpha_B$ " y " $\alpha_C$ ".

**Paso 1º**/ Todos los nudos giran en sentido positivo:

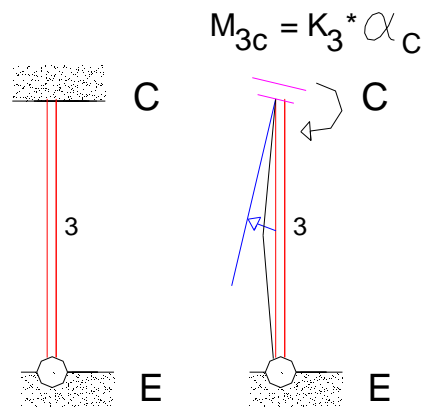
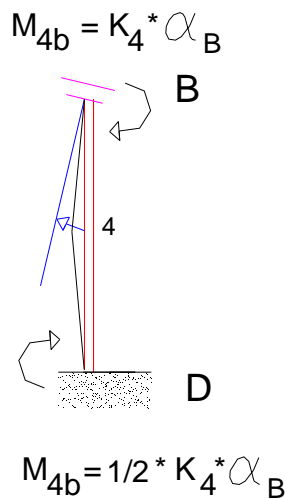
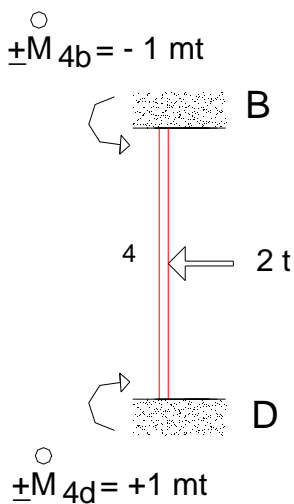
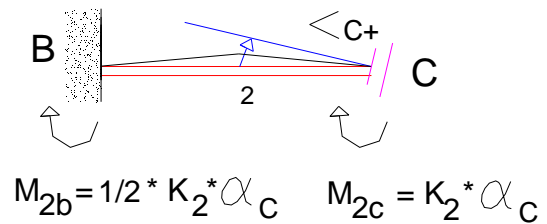
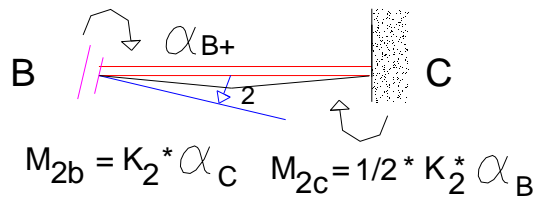
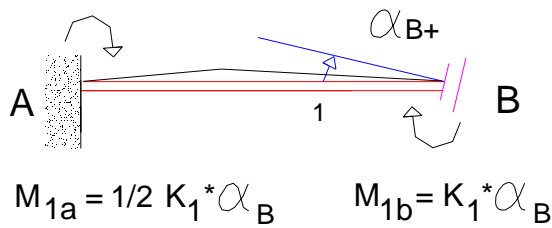
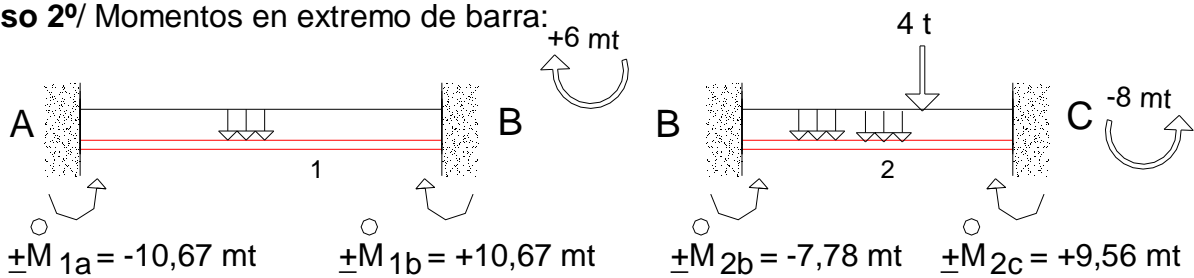


## Ejemplo n° 3: estructura intraslacional. (matricial)

**Paso 1º** Todos los nudos giran en sentido positivo:

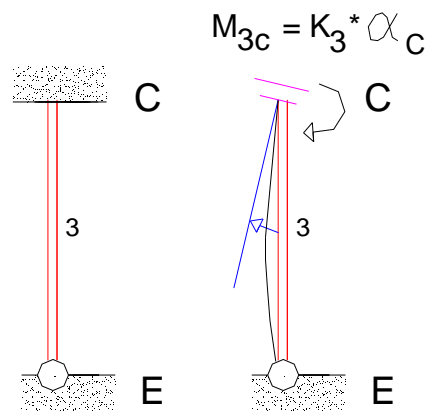
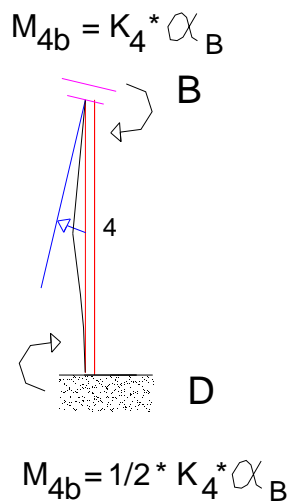
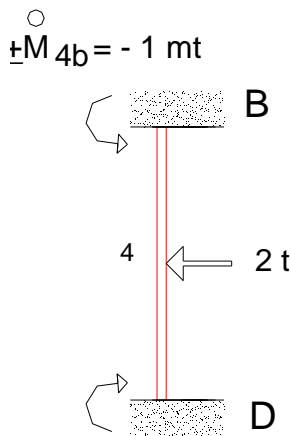
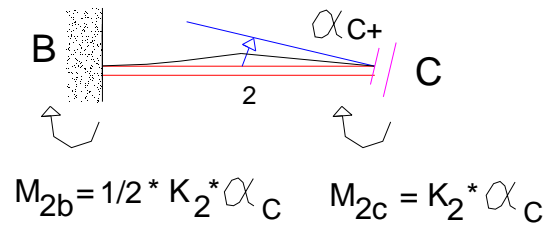
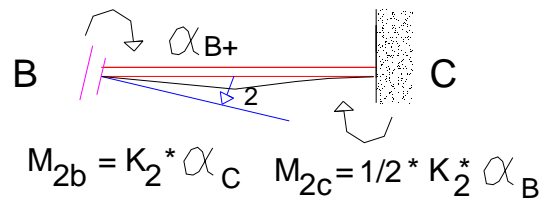
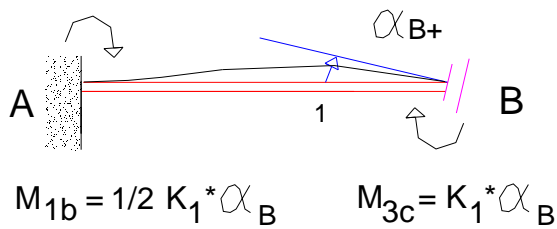
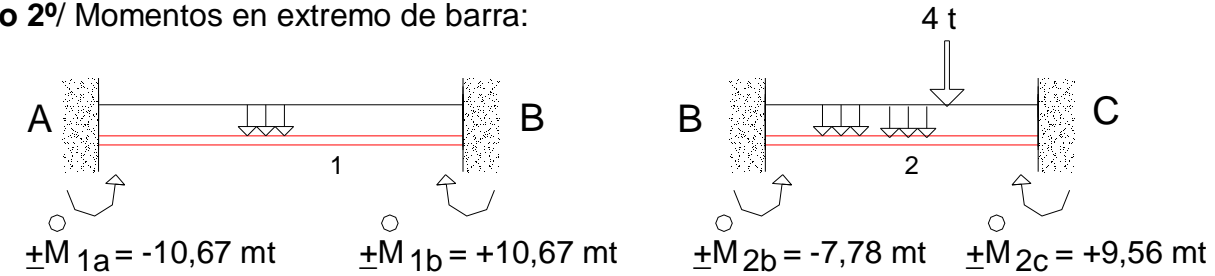


**Paso 2º** Momentos en extremo de barra:



## Ejemplo n° 3: pórtico intralacional.(método matricial).

Paso 2º/ Momentos en extremo de barra:



Paso 3º/ Equilibrio de momentos en los nudos:

	Matriz rigidez		Vector ?	Vector cargas nudos
	$\alpha_B$	$\alpha_C$		
$\alpha_B$	$K_1 + K_2 + K_4$	$1/2 K_2$	*	=
$\alpha_C$	$1/2 K_2$	$K_2 + K_3$		
				$-9,56 + 8 = -1,56$

### Ejemplo nº 3: pórtico intraslacional.(método matricial).

Paso 3º/ Equilibrio de momentos en los nudos:  $\sum M_B = 0$  y  $\sum M_C = 0$

	Matriz rigidez	Vector ?	Vector cargas nudos
	$\alpha_B$ $\alpha_C$		
$\alpha_B$	$K_1+K_2+K_4$	$\alpha_B$	$-10,67 - 6 + 7,78 + 1 = -7,89$
$\alpha_C$	$1/2 K_2$ $K_2 + K_3$	$\alpha_C$	$-9,56 + 8 = -1,56$

	$\alpha_B$ $\alpha_C$		
$\alpha_B$	$1+1+1$	$\alpha_B$	$-10,67 - 6 + 7,78 + 1 = -7,89$
$\alpha_C$	$1/2 * 1$ $1 + 1$	$\alpha_C$	$-9,56 + 8 = -1,56$

Paso 4º/ Cálculo del giro de nudos:  $\alpha_B = -2,6087 / EI$

$\alpha_C = -0,1278 / EI$

Paso 5º/ Momentos definitivos en extremo de barra:

Condiciones de contorno:

$$M_{1A} = -10,67 + 1 * \left( 0 + \frac{1}{2} * -2,6087 \right) = -11,97mt$$

$\alpha_A = \alpha_D = 0$ $\delta = 0$
--

$$M_{1B} = +10,67 + 1 * (-2,6087 + 0 * \alpha_A) = +8,06mt$$

$$M_{2B} = -7,78 + 1 * \left( -2,6087 + \frac{1}{2} * -0,1278 \right) = -10,45mt$$

$$M_{2C} = +9,56 + 1 * \left( -0,1278 + \frac{1}{2} * -2,6087 \right) = +8,13mt$$

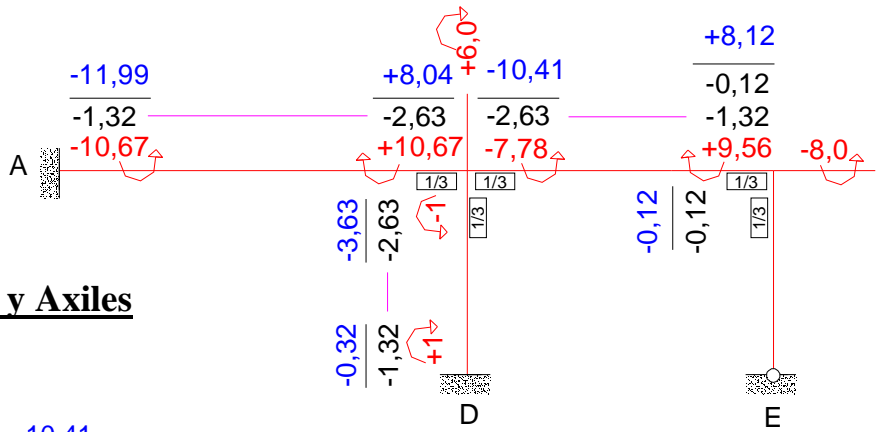
$$M_{3C} = 0,00 + 1 * (-0,1278 + 0 * \alpha_E) = -0,13mt$$

$$M_{3E} = 0,00mt \text{ (articulación)}$$

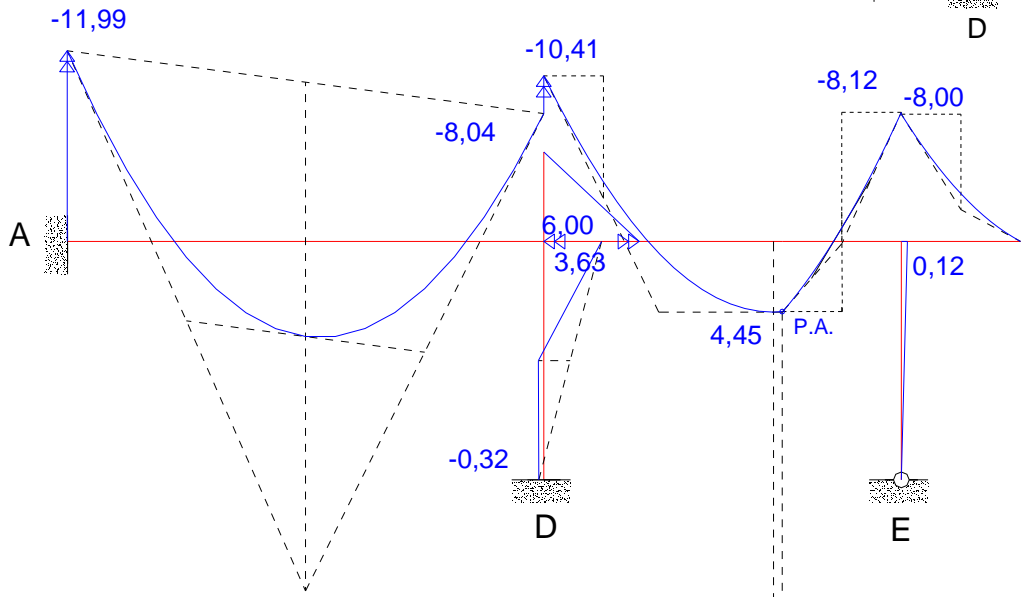
$$M_{4B} = -1 + 1 * \left( -2,6087 + \frac{1}{2} * 0 \right) = -3,61mt$$

$$M_{4D} = +1 + 1 * \left( 0 + \frac{1}{2} * -2,6087 \right) = -0,30mt$$

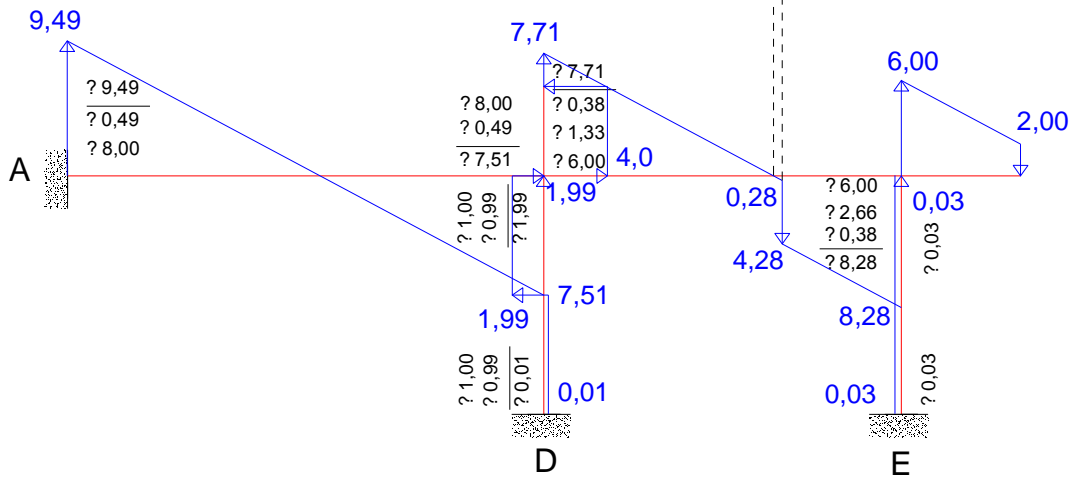
# Ejercicio nº 3. Pórtico intraslacional (diagramas).



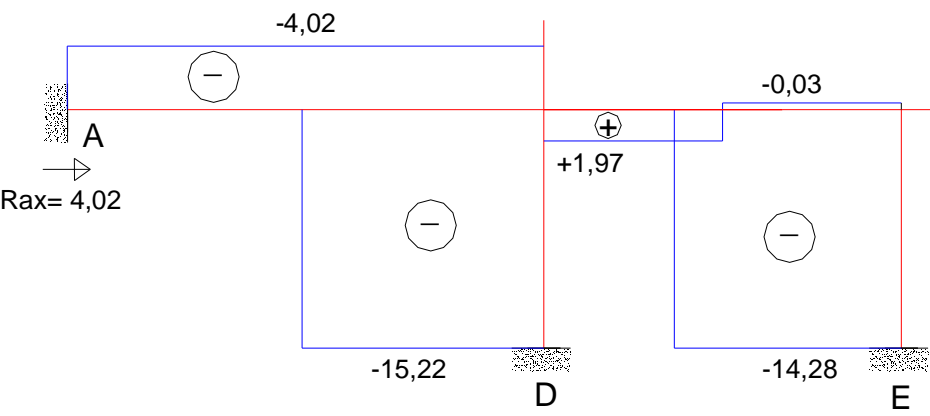
## Momentos Flectores, Cortantes y Axiles



M.F.



V.



N.

