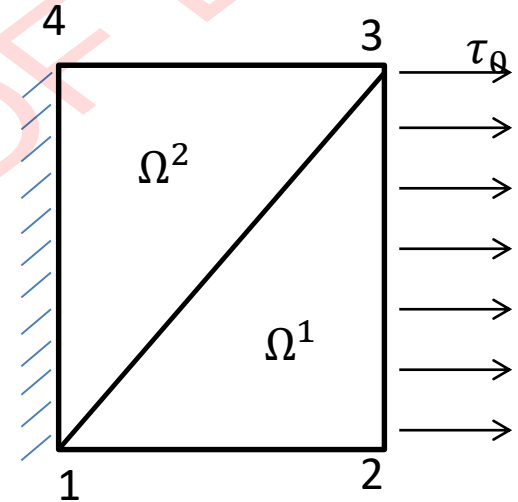


# Example:

Consider a rectangular piece of 120x160 mm and thickness 0.036mm. It is fixed to the wall (left) and pulled by a constant traction  $\tau_0 = 1000\text{N/mm}$ . Compute the **displacements** if the material has  $E = 30 \cdot 10^6 \text{N/mm}^2$  i  $\nu = 0.25$



# Example:

Nodes: (0,0) , (120,0), (120,160), (0,160)

Elem: [1,2,3; 3,4,1]

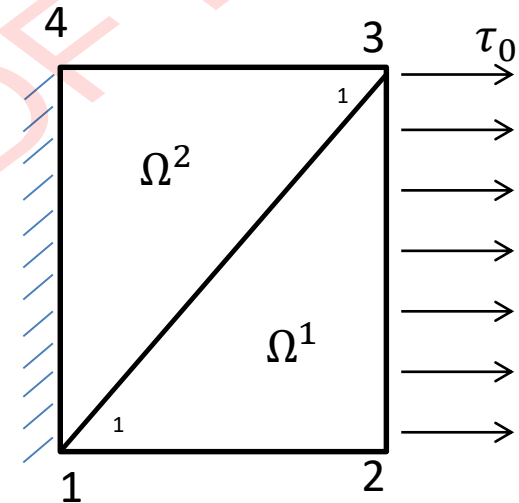
## Plane stress

$$c_{11} = c_{22} = \frac{E}{1 - \nu^2}$$

$$c_{12} = c_{21} = \nu c_{11}$$

$$c_{33} = \frac{E}{2(1 + \nu)}$$

$$K_e = 10^5 \cdot \begin{pmatrix} 7.68 & 0.00 & -7.68 & 1.44 & 0.00 & -1.44 \\ 0.00 & 2.88 & 2.16 & -2.88 & -2.16 & 0.00 \\ -7.68 & 2.16 & 9.30 & -3.60 & -1.62 & 1.44 \\ 1.44 & -2.88 & -3.60 & 7.20 & 2.16 & -4.32 \\ 0.00 & -2.16 & -1.62 & 2.16 & 1.62 & 0.00 \\ -1.44 & 0.00 & 1.44 & -4.32 & 0.00 & 4.32 \end{pmatrix}$$



BC:

$$u_{1x} = u_{1y} = 0$$

$$u_{4x} = u_{4y} = 0$$

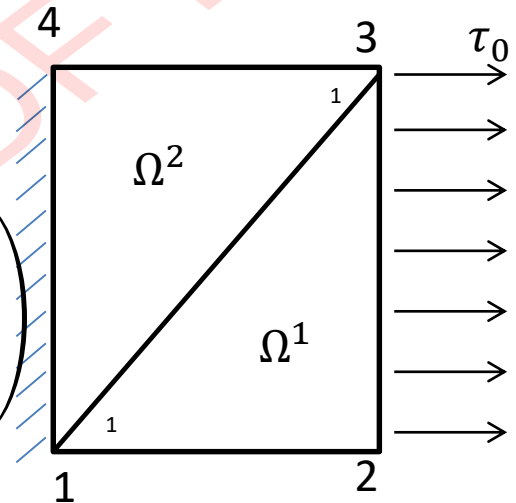
Loads:

$$Q_{2x} = t_h \cdot \frac{160}{3} \cdot 1000$$

$$Q_{3x} = t_h \cdot \frac{160}{3} \cdot 1000$$

# Example:

$$10^4 \begin{pmatrix} 93 & -36 & -16.2 & 14.4 \\ -36 & 72 & 21.6 & -43.2 \\ -16.2 & 21.6 & 93 & 0 \\ 14.4 & -43.2 & 0 & 72 \end{pmatrix} \begin{pmatrix} u_{2x} \\ u_{2y} \\ u_{3x} \\ u_{3y} \end{pmatrix} = t_h \cdot 80 \cdot \begin{pmatrix} 1000 \\ 0 \\ 1000 \\ 0 \end{pmatrix}$$



Solution:  $u_2 = (4.0648e - 03, 7.0692e - 4)$   
 $u_3 = (3.6406e - 03, -3.8881e - 4)$

