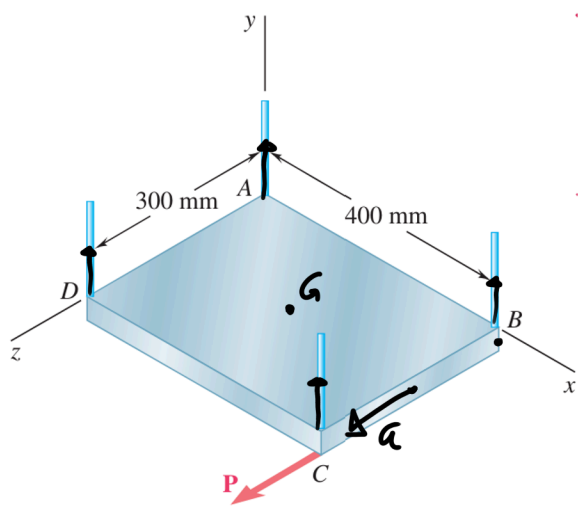
A rectangular plate of mass 5 kg is suspended from four vertical wires, and a force **P** of magnitude 6 N is applied to corner *C* as shown. Immediately after **P** is applied, determine the acceleration of (*a*) the midpoint of edge *BC*, (*b*) corner *B*.



$\Sigma \vec{F} = m\vec{a}$

$\Sigma \vec{M}_G = I\vec{\alpha}$

$\vec{P} = 6k \ N$

$\Sigma \vec{F} = m\vec{a}$

$6k\ N = m\vec{a} = 5\ kg\ \vec{a}$

$$\frac{6k\ \frac{kg\ m}{s^2}}{5\ kg} = 1.2k\ \frac{m}{s^2} = \vec{a}$$

$$I = \frac{1}{12} m(b^2 + c^2)$$

$$= \frac{1}{12} 5\ kg (300mm^2 + 400mm^2)$$

$$= 1.04 \times 10^5\ kg\ mm^2$$

$\Sigma \vec{M}_G = I\vec{\alpha}$

$-200mm(6N)j = I\vec{\alpha}$

$= 1.04 \times 10^5\ kg\ mm^2$

$$\frac{-200\ \cancel{mm}\ 6\ \frac{kg\ m}{s^2}}{1.04 \times 10^5\ \cancel{kg}\ mm^2} j = \vec{\alpha}$$

$$-0.012 \frac{m}{s^2 mm} \left(\frac{1000\ mm}{1\ m}\right) j = \vec{\alpha}$$

$$-11.5 \frac{rad}{s^2} j = \vec{\alpha}$$

$\vec{r} = \frac{400mm}{2} i = 200mm\ i$

$\vec{a} = \vec{a}_G + \vec{\alpha} \times \vec{r} - \cancel{\omega^2 \vec{r}}^{\,0}$

$$= 1.2k\ \frac{m}{s^2} + \begin{vmatrix} i & j & k \\ 0 & -11.5 & 0 \\ 200 & 0 & 0 \end{vmatrix} \quad \begin{matrix} i & j \\ 0 & -11.5 \\ 200 & 0 \end{matrix}$$

$$= 1.2k\ \frac{m}{s^2} + 11.5 \cdot 200\ mm/s^2\ k$$

$$= 1.2k\ \frac{m}{s^2} + 2.3\ \frac{m}{s^2} k$$

$$\boxed{= 3.5k\ \frac{m}{s^2}}$$ at midpoint from B to C