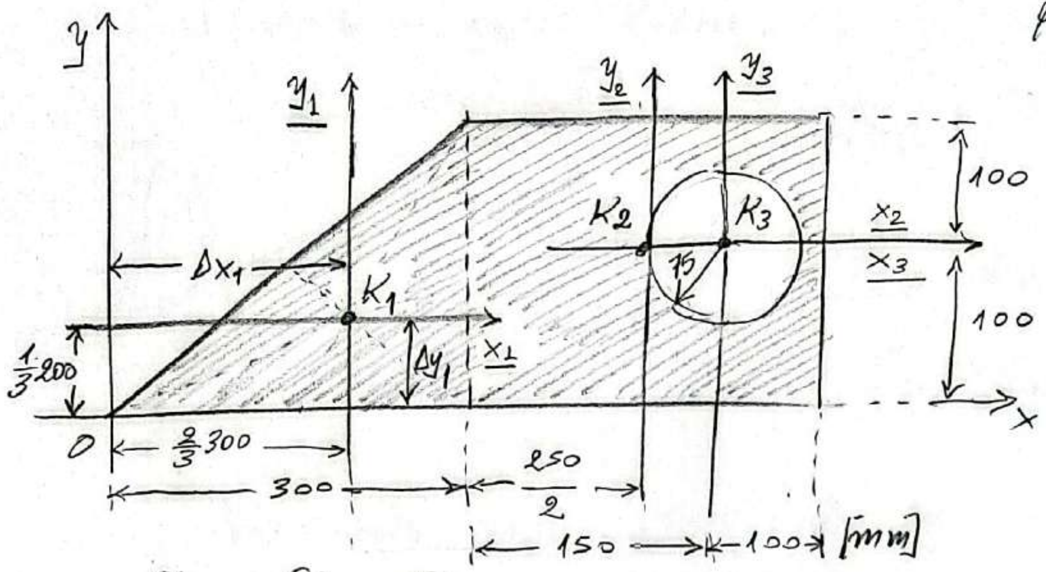
31η ΑΣΚΗΣΗ

Να υπολογισθούν οι επιφανει-
-ακές ροπές 2ης τάξης και η
φυγόκεντρος ροπή της (σύνθετης)
επιφάνειας του σχήματος
στο Oxy σύστημα αναφοράς



$$I_{xx} = I_{xx}^{(1)} + I_{xx}^{(2)} - I_{xx}^{(3)} =$$

$$= \underbrace{I_{x_1x_1}}_{bh^3/36} + \Delta y_1^2 A_1 + \underbrace{I_{x_2x_2}}_{bh^3/12} + \Delta y_2^2 A_2 - \Big[\underbrace{I_{x_3x_3}}_{\pi R^4/4} + \Delta y_3^2 \cdot A_3\Big] =$$

$$= \frac{300\times200^3}{36} + \underbrace{\left(\frac{200}{3}\right)^2}_{\Delta y_1} \frac{300\times200}{2} + \frac{250\times200^3}{12} + \underbrace{(100)^2}_{\Delta y_2} 250\times200 - \Big[\frac{\pi\times75^4}{4} + \underbrace{(100)^2}_{\Delta y_3} \pi\times75^2\Big] =$$

$$= \ldots \ mm^4$$

$$I_{yy} = I_{yy}^{(1)} + I_{yy}^{(2)} - I_{yy}^{(3)} =$$

$$= \underbrace{I_{y_1y_1}}_{hb^3/36} + \Delta x_1^2 A_1 + \underbrace{I_{y_2y_2}}_{hb^3/12} + \Delta x_2^2 A_2 - \Big[\underbrace{I_{y_3y_3}}_{\pi R^4/4} + \Delta x_3^2 A_3\Big] =$$

$$= \frac{200\times300^3}{36} + \underbrace{\left(\frac{2}{3}300\right)^2}_{\Delta x_1} \frac{300\times200}{2} + \frac{200\times250^3}{12} + \underbrace{\left(300 + \frac{250}{2}\right)^2}_{\Delta x_2} 250\times200 -$$

$$- \Big\{ \frac{\pi\times75^4}{4} + \underbrace{(300+150)^2}_{\Delta x_3} \pi\times75^2 \Big\} = \ldots \ mm^4$$

$$I_{xy} = I_{xy}^{(1)} + I_{xy}^{(2)} - I_{xy}^{(3)} =$$

$$= \underbrace{I_{x_1y_1}}_{-b^2h^2/72} - \Delta x_1 \Delta y_1 A_1 + \underbrace{I_{x_2y_2}}_{0} - \Delta x_2 \Delta y_2 A_2 - \Big[\underbrace{I_{x_3y_3}}_{0} - \Delta x_3 \Delta y_3 A_3\Big] =$$

$$= -\frac{300^2\times200^2}{72} - \underbrace{\left(\frac{2}{3}300\right)}_{\Delta x_1}\underbrace{\left(\frac{200}{3}\right)}_{\Delta y_1} \frac{300\times200}{2} + 0 - \underbrace{\left(300+\frac{250}{2}\right)}_{\Delta x_2}\underbrace{(100)}_{\Delta y_2} 250\times200 -$$

$$- \Big\{ 0 - \underbrace{(300+150)}_{\Delta x_3}\underbrace{(100)}_{\Delta y_3} \cdot \pi\times75^2 \Big\} = \ldots \ mm^4$$