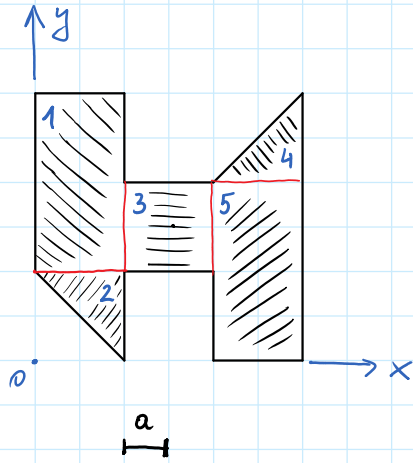


ŚRODKI CIĘŻKOŚCI

piątek, 15 kwietnia 2016 11:57



$$x_1 = 1 \quad x_2 = 2 - \frac{1}{3} \cdot 2 = \frac{6}{3} - \frac{2}{3} = \frac{4}{3}$$

$$y_1 = 4 \quad y_2 = \frac{4}{3}$$

$$A_1 = 8 \quad A_2 = 2$$

$$x_3 = 3 \quad x_4 = 6 - \frac{2}{3} = 5\frac{1}{3} = \frac{16}{3}$$

$$y_3 = 3 \quad y_4 = 4 + \frac{2}{3} = 4\frac{2}{3} = \frac{14}{3}$$

$$A_3 = 4 \quad A_4 = 2$$

$$x_5 = 5$$

$$y_5 = 2$$

$$A_5 = 8$$

$$x_c = \frac{1 \cdot 8 + \frac{4}{3} \cdot 2 + 3 \cdot 4 + \frac{16}{3} \cdot 2 + 5 \cdot 8}{8 + 2 + 4 + 8 + 2} = \frac{8 + \frac{8}{3} + 12 + \frac{32}{3} + 40}{24} = \frac{73\frac{1}{3}}{24} = 3\frac{1}{18} \approx 3,06a$$

$$y_c = \frac{4 \cdot 8 + \frac{4}{3} \cdot 2 + 3 \cdot 4 + \frac{14}{3} \cdot 2 + 2 \cdot 8}{24} = \frac{42}{24} = 3a$$

Środek ciężkości figury leży w punkcie $(x = 3,06; y = 3)$

$$I_{x_c}^1 = I_{x_1}^1 + A_1 r_1^2 = \frac{2 \cdot 4^3}{12} + 8 \cdot (3 - 4)^2 = 18,67 j^4$$

$$I_{x_c}^2 = I_{x_2}^2 + A_2 r_2^2 = \frac{2 \cdot 2^3}{36} + 2 \cdot \left(\frac{4}{3} - 3\right)^2 = 6 j^4$$

$$I_{x_c}^3 = I_{x_3}^3 + A_3 r_3^2 = \frac{2 \cdot 2^3}{12} + 4 \cdot (3 - 3)^2 = 1,33 j^4$$

$$I_{x_c}^4 = I_{x_4}^4 + A_4 r_4^2 = \frac{2 \cdot 2^3}{36} + 2 \cdot \left(\frac{14}{3} - 3\right)^2 = 6 j^4$$

$$I_{x_c}^5 = I_{x_5}^5 + A_5 r_5^2 = \frac{2 \cdot 4^3}{12} + 8 \cdot (2 - 3)^2 = 18,67 j^4$$

Moment bezwładności figury złożonej

$$I_{x_c} = I_{x_c}^1 + I_{x_c}^2 + I_{x_c}^3 + I_{x_c}^4 + I_{x_c}^5 = 50,67 j^4$$

$$I_{y_c}^1 = I_{y_1}^1 + A_1 r_1^2 = \frac{4 \cdot 2^3}{12} + 8 \cdot (3,06 - 1)^2 = 36,62 j^4$$

$$I_{Yc}^2 = I_{Y2}^2 + A_2 r_2^2 = \frac{2 \cdot 2^3}{36} + 2 \left(3,06 - \frac{4}{3}\right)^2 = 6,41 j^4$$

$$I_{Yc}^3 = I_{Y3}^3 + A_3 r_3^2 = \frac{2 \cdot 2^3}{12} + 4 \left(3,06 - 3\right)^2 = 1,35 j^4$$

$$I_{Yc}^4 = I_{Y4}^4 + A_4 r_4^2 = \frac{2 \cdot 2^3}{36} + 2 \left(3,06 - \frac{16}{3}\right)^2 = 10,78 j^4$$

$$I_{Yc}^5 = I_{Y5}^5 + A_5 r_5^2 = \frac{4 \cdot 2^3}{12} + 8 \left(3,06 - 5\right)^2 = 32,78 j^4$$

$$I_{Yc} = I_{Yc}^1 + I_{Yc}^2 + I_{Yc}^3 + I_{Yc}^4 + I_{Yc}^5 = 87,94 j^4$$