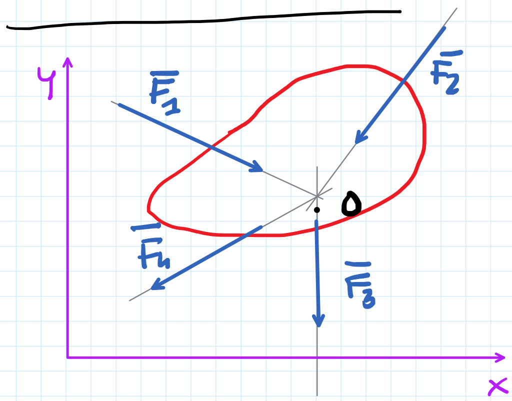
ZBIEŻNY UKŁAD SIŁ

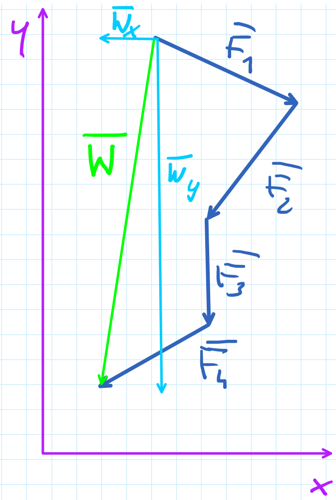


- PŁASKI
- PRZESTRZENNY

$$\overline{W}=\sum_{i=1}^{n}\overline{F}_i=\overline{F}_1+\overline{F}_2+\ldots+\overline{F}_n$$

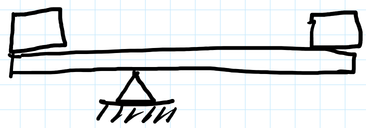
$$\overline{W}=\overline{W}_x+\overline{W}_y$$

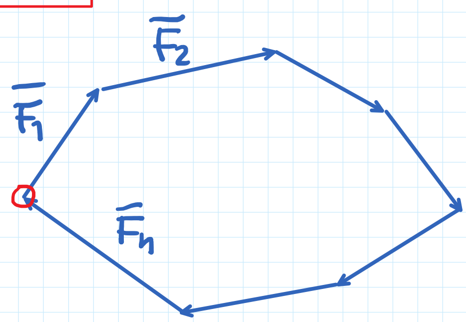
$$\begin{cases}|\overline{W}_x|=W_x=\sum_{i=1}^{n}F_{ix}\\ |\overline{W}_y|=W_y=\sum_{i=1}^{n}F_{iy}\end{cases}$$



RÓWNOWAGA PŁASKIEGO ZBIEŻNEGO UKŁADU

$$\boxed{\sum_{i=1}^{n}\overline{F}_i=0}\qquad \overline{F}_1+\overline{F}_2+\overline{F}_3+\ldots+\overline{F}_n=0$$



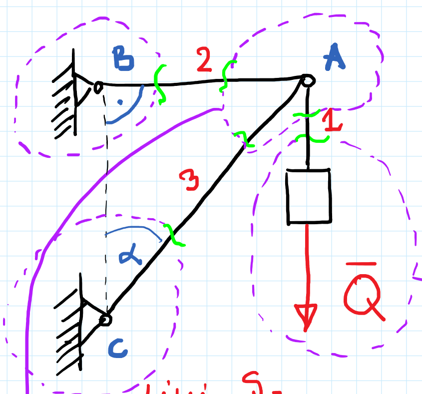


WIELOBOK ZAMKNIĘTY

- ANALITYCZNA,
- GEOMETRYCZNA

$$\boxed{\begin{cases}\sum F_{ix}=0\\ \sum F_{iy}=0\end{cases}}\Rightarrow\begin{cases}F_{1x}+F_{2x}+\ldots+F_{nx}=0\\ F_{1y}+F_{2y}+\ldots+F_{ny}=0\end{cases}$$

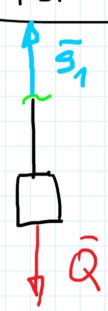
Z1



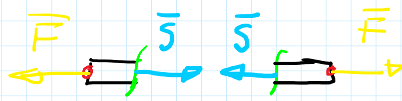
DANE:
α, $\overline{Q}$, GEOMETRIA

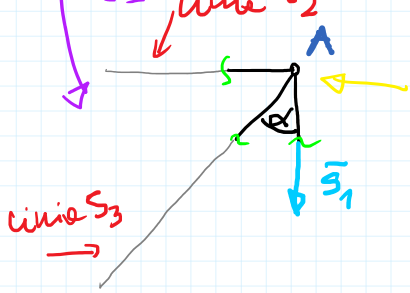
SZUKANE:
$\overline{S}_1$, $\overline{S}_2$, $\overline{S}_3$, $\overline{R}_B$, $\overline{R}_C$

UKŁAD W RÓWNOWADZE POD WPŁYWEM SIŁ ZEWNĘTRZNYCH



$$\overline{S}_1-\overline{Q}=0$$
$$\overline{S}_1=\overline{Q}$$

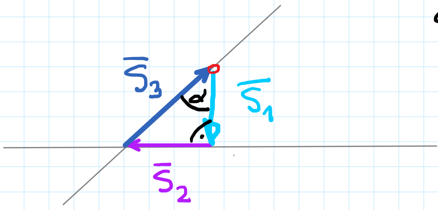




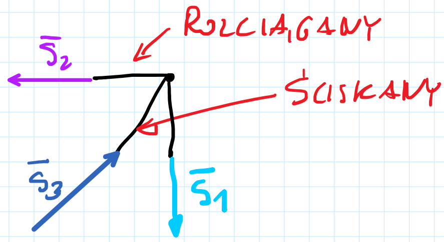
PUNKT ZBIEŻNOŚCI

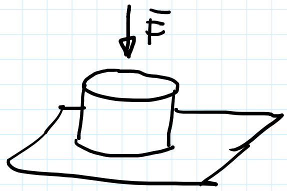
PŁASKI ZBIEŻNY UKŁAD SIŁ
⇓
WARUNKI RÓWNOWAGI $\Rightarrow\sum\overline{F}_i=0\Rightarrow\overline{S}_1+\overline{S}_2+\overline{S}_3=0$

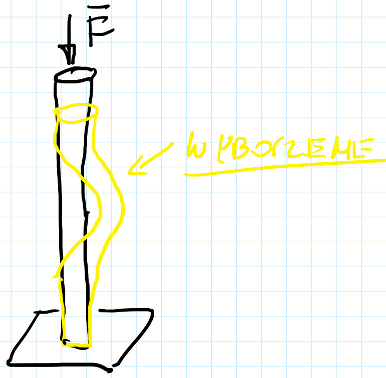
I. M. GEOMETRYCZNA



$$S_3 \cos\alpha = S_1$$
$$S_3 \sin\alpha = S_2$$
$$\Rightarrow \quad S_3 = \frac{S_1}{\cos\alpha}$$
$$S_2 = \frac{S_1}{\cos\alpha} \cdot \sin\alpha$$

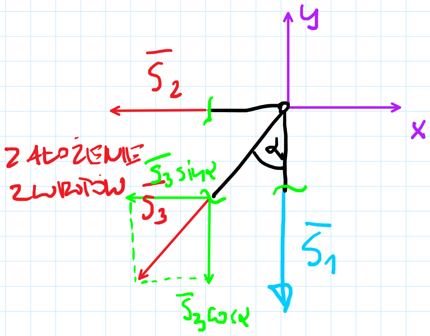






II. M. ANALITYCZNA

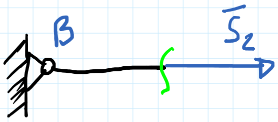
$$\bar{S}_1 + \bar{S}_2 + \bar{S}_3 = 0 \Rightarrow \begin{cases} S_{1x} + S_{2x} + S_{3x} = 0 \\ S_{1y} + S_{2y} + S_{3y} = 0 \end{cases} = \begin{cases} 0 - S_2 - S_3 \sin\alpha = 0 \\ -S_1 + 0 - S_3 \cos\alpha = 0 \end{cases}$$

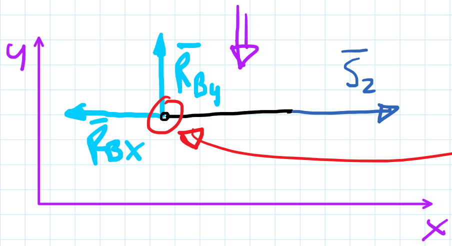


$$\begin{cases} S_2 = -S_3 \sin\alpha \\ S_3 = -\dfrac{S_1}{\cos\alpha} \end{cases} \Rightarrow \begin{cases} S_2 = -\left(-\dfrac{S_1}{\cos\alpha}\right) \cdot \sin\alpha = +\dfrac{S_1}{\cos\alpha} \cdot \sin\alpha \\ S_3 = -\dfrac{S_1}{\cos\alpha} \end{cases}$$

ZWROT S_3 PRZECIWNY

ZWROT S_2 ZGODNY





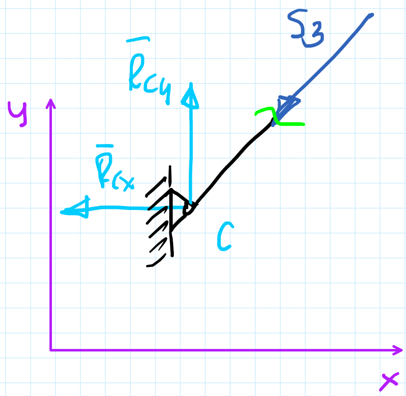
$$\bar{R}_B = \bar{R}_{Bx} + \bar{R}_{By}$$

PŁASKI ZBIEŻNY UKŁAD SIŁ $\Rightarrow$ WARUNEK RÓWNOWAGI

$$\Sigma \bar{F}_i = 0 \Rightarrow \bar{R}_{Bx} + \bar{R}_{By} + \bar{S}_2 = 0$$

$$R_{By} = 0 \qquad -\bar{R}_{Bx} + \bar{S}_2 = 0$$

$$R_{Bx} = R_B = S_2$$



WARUNEK RÓWNOWAGI:

$$\bar{S}_3 + \bar{R}_{Cx} + \bar{R}_{Cy} = 0$$

$$\bar{R}_C = \bar{R}_{Cx} + \bar{R}_{Cy}$$