(6) Rozwiązanie przy użyciu tw. o zmianie pędu i krętu

$$\overset{\circ}{\vec{p}} = \underbrace{\sum \vec{F}_i}_{\vec{0}} + \sum \vec{R}_j$$

$$\overset{\circ}{\vec{K}_o} = \underbrace{\sum \vec{M}_o(\vec{F}_i)}_{\vec{0}} + \sum \vec{M}_o(\vec{R}_j)$$

Pęd: $\vec{p} = \vec{p}_m + \vec{p}_M \qquad \vec{p}_m = m \cdot \overset{\vec{0}}{\overset{\parallel}{\vec{V}_m}} = \vec{0} \qquad \vec{p}_M = M\vec{V}_M$

$\vec{V}_M = \vec{\Omega} \times \vec{r}_M \;; \quad \vec{r}_M = [0,\ b+h,\ 0]^T \qquad \vec{V}_M = [-\Omega(b+h),\ 0,\ 0]^T$

$\vec{p}_M = [-M\Omega(b+h),\ 0,\ 0]^T = \vec{p}$ bo $M, \Omega, b, h = \text{const}$

$\overset{\circ}{\vec{p}} = (\overset{\circ}{\vec{p}})_{lok} + \vec{\Omega} \times \vec{p} \;; \quad (\overset{\circ}{\vec{p}})_{lok} = \vec{0} \qquad \vec{\Omega} \times \vec{p} = [0,\ -\Omega p,\ 0]^T$

$\overset{\circ}{\vec{p}} = [0,\ -\frac{V_D}{b} M\Omega(b+h),\ 0]^T = [0,\ -(\frac{V_D}{b})^2 M(b+h),\ 0]^T$

Kręt: $\vec{K}_o = \mathbb{I}_o \vec{\omega} \;; \quad \vec{\omega} = \vec{\Omega} + \vec{\omega}_1 = [0,\ \omega_1,\ V_D/b]^T$

$$\mathbb{I}_o = \begin{bmatrix} \frac{1}{4}mr^2 + \frac{1}{4}ML^2 + M(b+h)^2 & 0 & 0 \\ 0 & \frac{1}{2}mr^2 + \frac{1}{2}ML^2 & 0 \\ 0 & 0 & \frac{1}{4}mr^2 + \frac{1}{4}ML^2 + M(b+h)^2 \end{bmatrix}$$

bo ciało jest symetryczne i symetrycznie położone w układzie

$\vec{K}_o = [0,\ (\frac{1}{2}mr^2 + \frac{1}{2}ML^2)\omega_1,\ (\frac{1}{4}mr^2 + \frac{1}{4}ML^2 + M(b+h)^2)\ V_D/b]^T$

$\overset{\circ}{\vec{K}_o} = (\overset{\circ}{\vec{K}_o})_{lok} + \vec{\Omega} \times \vec{K}_o \qquad (\overset{\circ}{\vec{K}_o})_{lok} = \vec{0} \qquad \vec{\Omega} \times \vec{K}_o = [\quad =$

$$= \begin{vmatrix} \vec{e}_\xi & \vec{e}_\eta & \vec{e}_\zeta \\ 0 & 0 & V_D/b \\ 0 & K_{o\eta} & K_{o\zeta} \end{vmatrix} = [-K_{o\eta} \cdot V_D/b,\ 0,\ 0]^T = [-(\frac{1}{2}mr^2 + \frac{1}{2}ML^2)\omega_1 \frac{V_D}{b},\ 0,$$

$$\begin{cases} 0 = R_{A\xi} + R_{B\xi} \\ -(\frac{V_D}{b})^2 M(b+h) = R_{A\eta} \\ 0 = R_{A\zeta} + R_{B\zeta} \end{cases}$$

$$\begin{cases} -(\frac{1}{2}mr^2 + \frac{1}{2}ML^2)\omega_1 \frac{V_D}{b} = -a R_{A\zeta} + b R_{B\zeta} \\ 0 = 0 \\ 0 = a R_{A\xi} - b \cdot R_{B\xi} \end{cases}$$

$R_{A\zeta} = -R_{B\zeta}$

$$\Rightarrow R_{B\zeta} = \frac{-(\frac{1}{2}mr^2 + \frac{1}{2}ML^2)\omega_1 \frac{V_D}{b}}{a+b}$$

$$R_{A\zeta} = \frac{(\frac{1}{2}mr^2 + \frac{1}{2}ML^2)\omega_1 \frac{V_D}{b}}{a+b}$$

$R_{A\xi} = 0, \quad R_{B\xi} = 0$