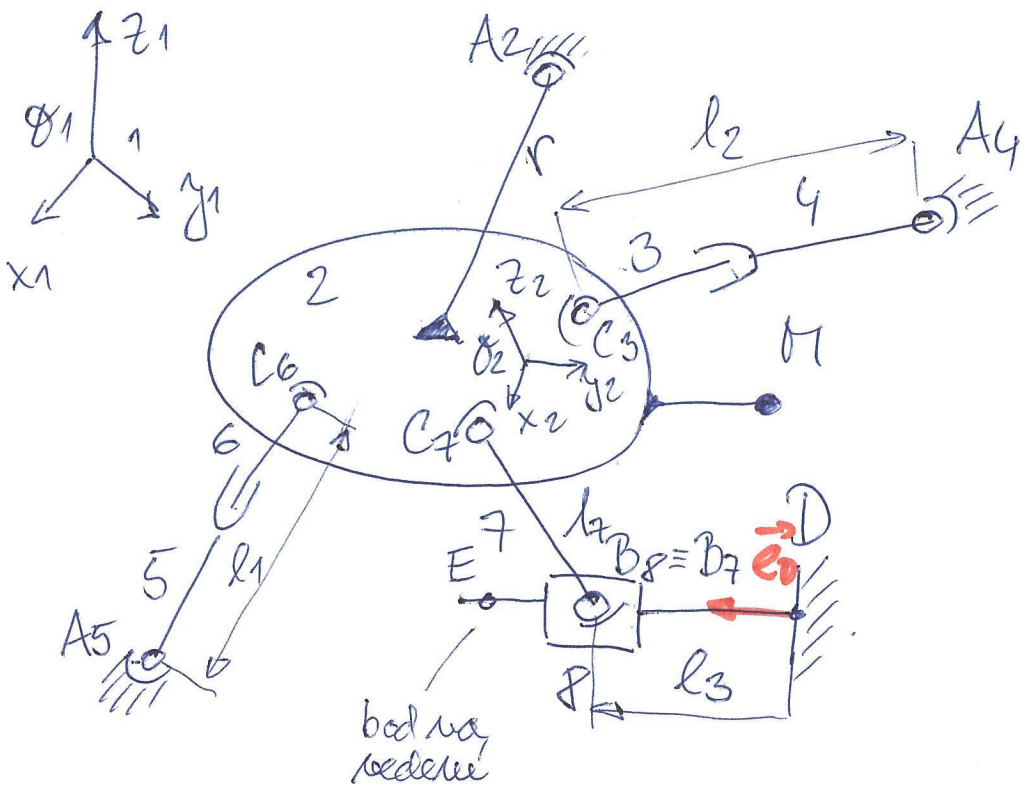

$$n = 6(8-1) - 7sf \cdot 3 - 3pos \cdot 5 = 42 - 21 - 15 =$$

$$= 6° vol. - 3 paroz. = \underline{3° vol. \; stut.}$$

Řešitelnost:

$$\underline{S} = [\underbrace{x_{102}, y_{102}, z_{102}, \varphi_{x12}, \varphi_{y12}, \varphi_{z12}}, l_1, l_2, l_3]^T$$

těleso 2 uložíme na ram sférickou vazbou, proto stačí pro popis polohy 3 souřadnice

$$\Rightarrow \varphi_{x12}, \varphi_{y12}, \varphi_{z12}$$

$$\underline{S} = [\varphi_{x12}, \varphi_{y12}, \varphi_{z12}, l_1, l_2, l_3]^T$$

6 souřadnic - 3° vol = 3 vazbové rovnice

$\Rightarrow$ myslíme skepsin „5-6", „3-4" a tělesa 7

$\Rightarrow$ 3 vazbové rovnice $l_1 = |A_5C_6|$ $l_2 = |A_4C_3|$ $l_7 = |B_8C_7|$

$\Rightarrow$ řešitelné

Vyjmuté těleso 7

$$l_7 = |B_8C_7| = |\underline{r}_{1C7} - \underline{r}_{1B8}|$$

$$\underline{r}_{1C7} = \underline{T}_{12} \cdot \underline{r}_{2C7}$$

$$\underline{r}_{1B8} = \underline{T}_{18} \cdot \underline{r}_{8B8} \rightarrow \text{lépe pomocí jedn. vektoru}$$

$$\underline{T}_{12} = \underline{T}_x(x_{1A_2})\underline{T}_y(y_{1A_2})\underline{T}_z(z_{1A_2})\underline{T}_{\varphi x}(\varphi_{x12})\underline{T}_{\varphi y}(\varphi_{y12})\underline{T}_{\varphi z}(\varphi_{z12})$$

$$\underline{T}_{18} = \underline{T}_x(x_{1D})\underline{T}_y(y_{1D})\underline{T}_z(z_{1D})$$

$$\underline{r}_{2C7} = [x_{2C7}, y_{2C7}, z_{2C7}, 1]^T$$

$$\underline{r}_{1B8} = \begin{bmatrix} x_{1D} \\ y_{1D} \\ z_{1D} \\ 1 \end{bmatrix} + \begin{bmatrix} l_3 \cdot \underline{e}_D \\ \\ 1 \end{bmatrix} \qquad \vec{e}_D = \left[\frac{x_{1E}-x_{1D}}{|ED|}, \frac{y_{1E}-y_{1D}}{|ED|}, \frac{z_{1E}-z_{1D}}{|ED|} \right]^T$$

$$|ED| = \sqrt{(x_{1D}-x_{1E})^2 + (y_{1D}-y_{1E})^2 + (z_{1D}-z_{1E})^2}$$

Vyjmuté skupiny „3-4"

$$l_2 = |A_4C_3| = |\underline{r}_{1A4} - \underline{r}_{1C3}| \qquad \underline{r}_{1A4} = [x_{1A4}, y_{1A4}, z_{1A4}, 1]^T$$

$$\underline{r}_{1C3} = \underline{T}_{12} \cdot \underline{r}_{2C3} \qquad \underline{r}_{2C3} = [x_{2C3}, y_{2C3}, z_{2C3}, 1]^T$$

Vyjmuté skupiny „5-6"

$$l_1 = |A_5C_6| = |\underline{r}_{1A5} - \underline{r}_{1C6}| \qquad \underline{r}_{1A5} = [x_{1A5}, y_{1A5}, z_{1A5}, 1]^T$$

$$\underline{r}_{1C6} = \underline{T}_{12}\,\underline{r}_{2C6} \qquad \underline{r}_{2C6} = [x_{2C6}, y_{2C6}, z_{2C6}, 1]^T$$