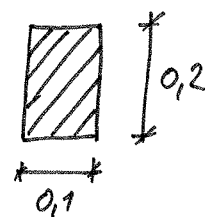
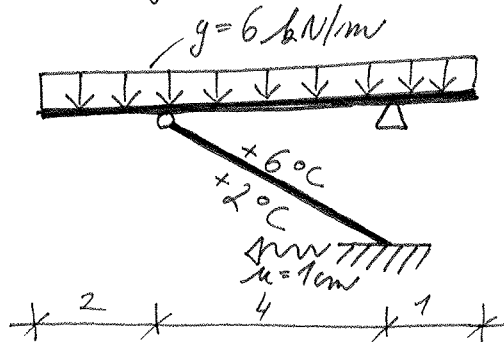
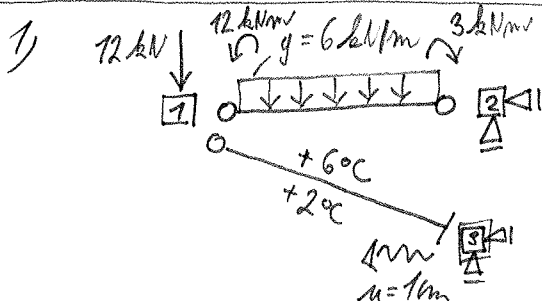


Výpočet deformační stav konstrukce.



$$E = 2 \cdot 10^7 \text{ kPa}$$

$$\alpha = 1 \cdot 10^{-5} \text{ } ^\circ\text{C}^{-1}$$



$$N_p = 2; \{r\} = \begin{Bmatrix} w_1 \\ w_1 \end{Bmatrix}; \{s\} = \begin{Bmatrix} 0 \\ 12 \end{Bmatrix} \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix}$$

2) PRUT 1,2

$l =$

$$[K_{1,2}] = \begin{bmatrix} \text{ } & \text{ } \\ \text{ } & \text{ } \end{bmatrix} \begin{matrix} u_1 \\ w_1 \\ \varphi_1 \\ u_2 \\ w_2 \\ \varphi_2 \end{matrix}; \{\bar{R}_{1,2}\} = \begin{Bmatrix} X_1 \\ Z_1 \\ M_1 \\ X_2 \\ Z_2 \\ M_2 \end{Bmatrix}$$

PRUT 1,3

$l =$

$\delta_{1,3} =$

$\Delta =$

$C =$

$$[K_{1,3}] = \begin{bmatrix} \text{ } & \text{ } \\ \text{ } & \text{ } \end{bmatrix} \begin{matrix} u_1 \\ w_1 \\ \varphi_1 \\ u_3 \\ w_3 \\ \varphi_3 \end{matrix}; \{\bar{R}_{1,3}^*\} = \begin{Bmatrix} X_1^* \\ Z_1^* \\ M_1^* \\ X_3^* \\ Z_3^* \\ M_3^* \end{Bmatrix}; \{\bar{R}_{1,3}\} = \begin{Bmatrix} X_1 \\ Z_1 \\ M_1 \\ X_3 \\ Z_3 \\ M_3 \end{Bmatrix}$$

$$[K] = \begin{bmatrix} 151 & 38 \\ 277 & 384 \\ 38 & 28 \\ 384 & 820 \end{bmatrix} \begin{matrix} u_1 \\ w_1 \end{matrix}; \{\bar{R}\} = \begin{Bmatrix} X_1 \\ Z_1 \end{Bmatrix}$$

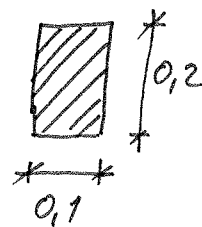
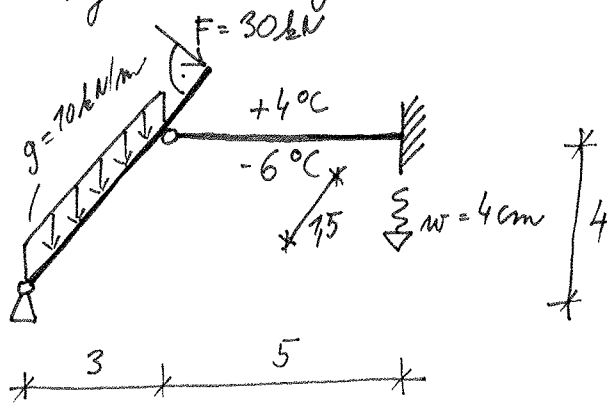
$$\{\tilde{R}\} = \begin{Bmatrix} X_1 \\ Z_1 \end{Bmatrix}; \{F\} = \begin{Bmatrix} -524,963 \\ -367,132 \end{Bmatrix} \begin{Bmatrix} X_1 \\ Z_1 \end{Bmatrix};$$

$$[K] \cdot \{r\} = \{F\};$$

$$u_1 = \frac{\text{del}[K]}{\text{del}[K]} = -3,5965 \cdot 10^{-4} \text{ m}$$

$$w_1 = \frac{\text{del}[K]}{\text{del}[K]} = -1,2260 \cdot 10^{-2} \text{ m}$$

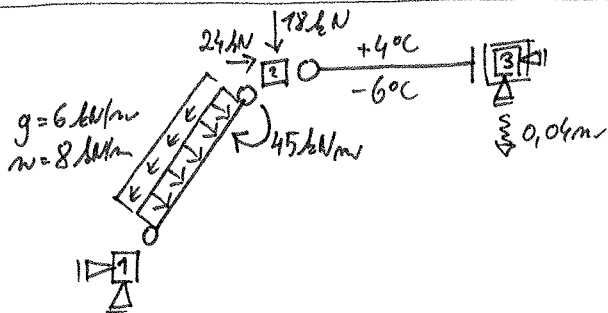
Vyřešte deformační stav konstrukce.



$$E = 2 \cdot 10^7 \text{ kPa}$$

$$\alpha = 1 \cdot 10^{-5} \text{ } ^\circ\text{C}^{-1}$$

1)



$$N_F = 2; \{r\} = \begin{Bmatrix} u_2 \\ w_2 \end{Bmatrix}; \{S\} = \begin{Bmatrix} 24 \\ 18 \end{Bmatrix} \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix}$$

2) PRUT 1,2

$$l =$$

$$y_{1,2} =$$

$$\delta =$$

$$c =$$

$$[K_{1,2}] = \begin{bmatrix} u_1 & w_1 & y_1 \\ u_2 & w_2 & y_2 \end{bmatrix}; \{\bar{R}_{1,2}^*\} = \begin{Bmatrix} X_1^* \\ Z_1^* \\ M_1^* \\ X_2^* \\ Z_2^* \\ M_2^* \end{Bmatrix}; \{\bar{R}_{1,2}\} = \begin{Bmatrix} X_1 \\ Z_1 \\ M_1 \\ X_2 \\ Z_2 \\ M_2 \end{Bmatrix}$$

PRUT 2,3

$$l =$$

$$[K_{2,3}] = \begin{bmatrix} u_2 & w_2 & y_2 \\ u_3 & w_3 & y_3 \end{bmatrix}; \{\bar{R}_{2,3}\} = \begin{Bmatrix} X_2 \\ Z_2 \\ M_2 \\ X_3 \\ Z_3 \\ M_3 \end{Bmatrix}; \{\tilde{R}_{2,3}\} = \begin{Bmatrix} X_2 \\ Z_2 \\ M_2 \\ X_3 \\ Z_3 \\ M_3 \end{Bmatrix}$$

$$\{\tilde{X}_{2,3}\} = \begin{Bmatrix} ; \\ ; \\ 1 \\ ; \\ ; \end{Bmatrix}^T; \{\tilde{R}_{2,3}\} = [K_{2,3}] \cdot \{\tilde{X}_{2,3}\}$$

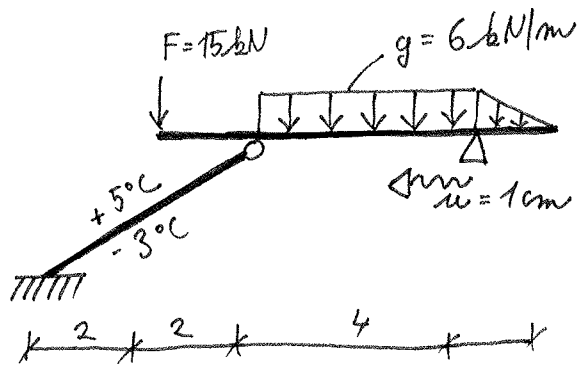
$$3) [K] = \begin{bmatrix} u_2 & w_2 \\ 108 & -38 \\ 800 & 400 \\ -38 & 51 \\ 400 & 232 \end{bmatrix} \begin{Bmatrix} u_2 \\ w_2 \end{Bmatrix}; \{\bar{R}\} = \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix}; \{\tilde{R}\} = \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix}; \{F\} = \begin{Bmatrix} 35,2 \\ 49,88 \end{Bmatrix} \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix}$$

$$[K] \cdot \{r\} = \{F\}$$

$$u_2 = \frac{\det \begin{bmatrix} \text{---} & \text{---} \\ \text{---} & \text{---} \end{bmatrix}}{\det [K]} = 9,0713 \cdot 10^{-4} \text{ m}$$

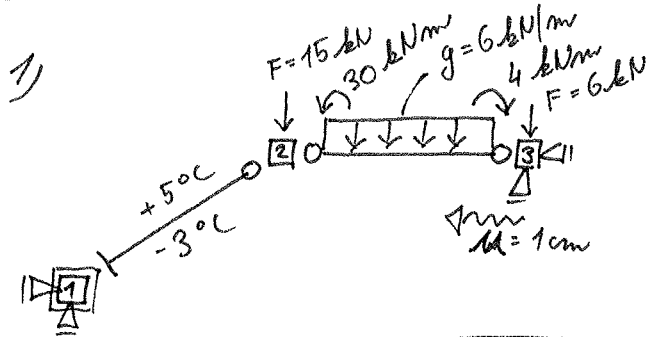
$$w_2 = \frac{\det \begin{bmatrix} \text{---} & \text{---} \\ \text{---} & \text{---} \end{bmatrix}}{\det [K]} = 1,6535 \cdot 10^{-3} \text{ m}$$

Vyřešte deformační MDO konstrukce.



$$E = 2 \cdot 10^7 \text{ bPa}$$

$$\alpha = 1 \cdot 10^{-5} \text{ } ^\circ\text{C}^{-1}$$



$$n_f = 2 ; \{r\} = \begin{Bmatrix} u_2 \\ w_2 \end{Bmatrix} ; \{S\} = \begin{Bmatrix} 0 \\ 15 \end{Bmatrix} \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix}$$

2) PRUT 1,2

$$l =$$

$$x_{1,2} =$$

$$\lambda =$$

$$c =$$

$$[K_{1,2}] = \begin{bmatrix} \begin{matrix} u_1 & u_1 & \varphi_1 \\ u_2 & u_2 & \varphi_2 \end{matrix} & \begin{matrix} u_1 \\ u_1 \\ \varphi_1 \\ u_2 \\ u_2 \\ \varphi_2 \end{matrix} \end{bmatrix}$$

$$\begin{matrix} +5^\circ\text{C} \\ -3^\circ\text{C} \end{matrix}$$

$$\{\bar{R}_{1,2}^*\} = \begin{Bmatrix} X_1^* \\ Z_1^* \\ M_1^* \\ X_2^* \\ Z_2^* \\ M_2^* \end{Bmatrix} ; \{\bar{R}_{1,2}\} = \begin{Bmatrix} X_1 \\ Z_1 \\ M_1 \\ X_2 \\ Z_2 \\ M_2 \end{Bmatrix}$$

PRUT 2,3

$$l =$$

$$[K_{2,3}] = \begin{bmatrix} \begin{matrix} u_2 & u_2 & \varphi_2 \\ u_3 & u_3 & \varphi_3 \end{matrix} & \begin{matrix} u_2 \\ u_2 \\ \varphi_2 \\ u_3 \\ u_3 \\ \varphi_3 \end{matrix} \end{bmatrix}$$

$$30 \text{ kNm} \quad 6 \text{ kN/m} \quad 4 \text{ kNm}$$

$$\{\bar{R}_{2,3}^*\} = \{\bar{R}_{2,3}\} = \begin{Bmatrix} X_2 \\ Z_2 \\ M_2 \\ X_3 \\ Z_3 \\ M_3 \end{Bmatrix} ; \{\tilde{R}_{2,3}\} = \begin{Bmatrix} X_2 \\ Z_2 \\ M_2 \\ X_3 \\ Z_3 \\ M_3 \end{Bmatrix}$$

$$\{\tilde{R}_{2,3}\} = \begin{Bmatrix} ; & ; & | & ; & ; \end{Bmatrix}^T ; \{\tilde{R}_{2,3}\} = [K_{2,3}] \cdot \{\tilde{R}_{2,3}\}$$

3)

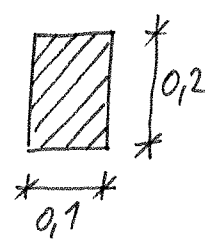
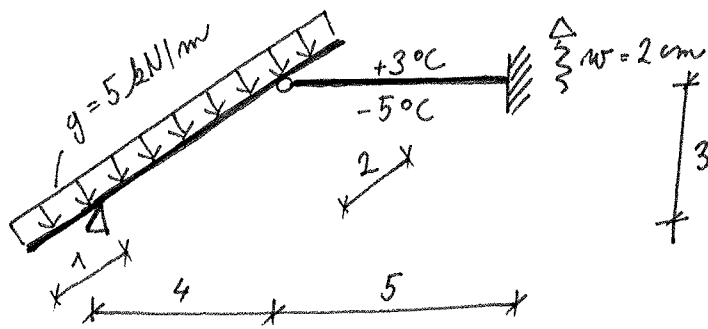
$$[K] = \begin{bmatrix} \begin{matrix} u_2 & u_2 \\ 151 & -38 \\ 271 & 384 \end{matrix} & \begin{matrix} u_2 \\ u_2 \end{matrix} \\ \begin{matrix} -38 & 28 \\ 384 & 820 \end{matrix} & \begin{matrix} u_2 \\ u_2 \end{matrix} \end{bmatrix} ; \{\bar{R}\} = \begin{Bmatrix} - \\ - \end{Bmatrix} \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix} ; \{\tilde{R}\} = \begin{Bmatrix} - \\ - \end{Bmatrix} \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix} ; \{F\} = \begin{Bmatrix} -966,704 \\ 31,228 \end{Bmatrix} \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix}$$

$$[K] \cdot \{r\} = \{F\}$$

$$u_2 = \frac{\text{del} \begin{bmatrix} - & + \end{bmatrix}}{\text{del} [K]} = -9,5427 \cdot 10^{-3} \text{ m}$$

$$w_2 = \frac{\text{del} \begin{bmatrix} - & + \end{bmatrix}}{\text{del} [K]} = -1,1626 \cdot 10^{-2} \text{ m}$$

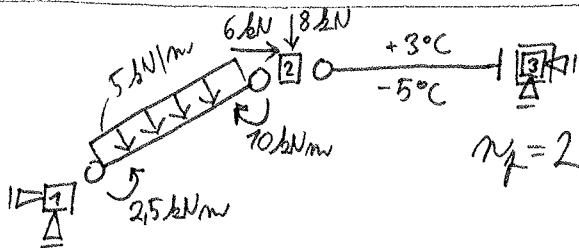
Výřešte deformační stav konstrukce.



$$E = 2 \cdot 10^7 \text{ kPa}$$

$$\alpha = 1 \cdot 10^{-5} \text{ } ^\circ\text{C}^{-1}$$

1)



$$n_f = 2 ; \{r\} = \begin{Bmatrix} w_2 \\ z_2 \end{Bmatrix} ; \{s\} = \begin{Bmatrix} 6 \\ 8 \end{Bmatrix} \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix}$$

2) PRUT 1,2

$$e =$$

$$\delta_{12} =$$

$$\delta =$$

$$c =$$

$$[K_{12}] = \begin{bmatrix} u_1 & w_1 & \varphi_1 \\ u_2 & w_2 & \varphi_2 \end{bmatrix}$$

$$\{\bar{R}_{12}^*\} = \begin{Bmatrix} X_1^* \\ Z_1^* \\ M_1^* \\ X_2^* \\ Z_2^* \\ M_2^* \end{Bmatrix} ; \{\bar{R}_{12}\} = \begin{Bmatrix} X_1 \\ Z_1 \\ M_1 \\ X_2 \\ Z_2 \\ M_2 \end{Bmatrix}$$

PRUT 2,3

$$e =$$

$$[K_{23}] = \begin{bmatrix} u_2 & w_2 & \varphi_2 \\ u_3 & w_3 & \varphi_3 \end{bmatrix}$$

$$\{\bar{R}_{23}\} = \begin{Bmatrix} X_2 \\ Z_2 \\ M_2 \\ X_3 \\ Z_3 \\ M_3 \end{Bmatrix} ; \{\bar{R}_{23}\} = \begin{Bmatrix} X_2 \\ Z_2 \\ M_2 \\ X_3 \\ Z_3 \\ M_3 \end{Bmatrix}$$

$$\{\tilde{R}_{23}\} = \{ \quad ; \quad ; \quad ; \quad ; \quad ; \quad \}^T ; \{\tilde{R}_{23}\} = [K_{23}] \cdot \{\tilde{R}_{23}\}$$

3)

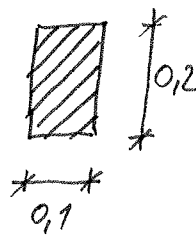
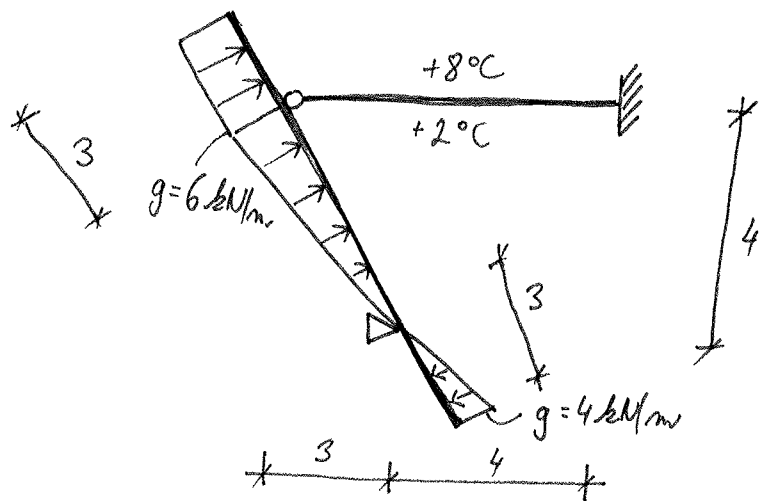
$$[K] = \begin{bmatrix} u_2 & w_2 \\ 131 \ 200 & -38 \ 400 \\ -38 \ 400 & 28 \ 832 \end{bmatrix} \begin{Bmatrix} u_2 \\ w_2 \end{Bmatrix} ; \{\bar{R}\} = \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix} ; \{\tilde{R}\} = \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix} ; \{F\} = \begin{Bmatrix} 18,4 \\ 18,72 \end{Bmatrix}$$

$$[K] \cdot \{r\} = \{F\}$$

$$u_2 = \frac{\det \begin{bmatrix} \text{---} & \text{---} \\ \text{---} & \text{---} \end{bmatrix}}{\det [K]} = 5,4127 \cdot 10^{-4} \text{ m}$$

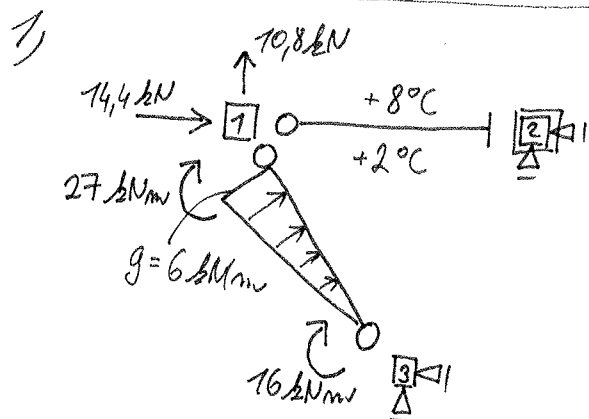
$$w_2 = \frac{\det \begin{bmatrix} \text{---} & \text{---} \\ \text{---} & \text{---} \end{bmatrix}}{\det [K]} = 1,3702 \cdot 10^{-3} \text{ m}$$

Vyřešte deformační stav konstrukce.



$$E = 2 \cdot 10^7 \text{ bPa}$$

$$\alpha = 1 \cdot 10^{-5} \text{ } ^\circ\text{C}^{-1}$$



$$N_f = 2 ; \{r\} = \begin{Bmatrix} w_1 \\ w_1 \end{Bmatrix} ; \{S\} = \begin{Bmatrix} 14.4 \\ -10.8 \end{Bmatrix} \begin{Bmatrix} X_1 \\ Z_1 \end{Bmatrix}$$

2) PRUT 1,2

$$[K_{1,2}] = \begin{bmatrix} u_1 & w_1 & \varphi_1 \\ u_2 & w_2 & \varphi_2 \end{bmatrix} ; \{R_{1,2}\} = \begin{Bmatrix} X_1 \\ Z_1 \\ M_1 \\ X_2 \\ Z_2 \\ M_2 \end{Bmatrix}$$

PRUT 1,3

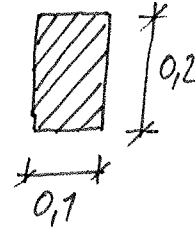
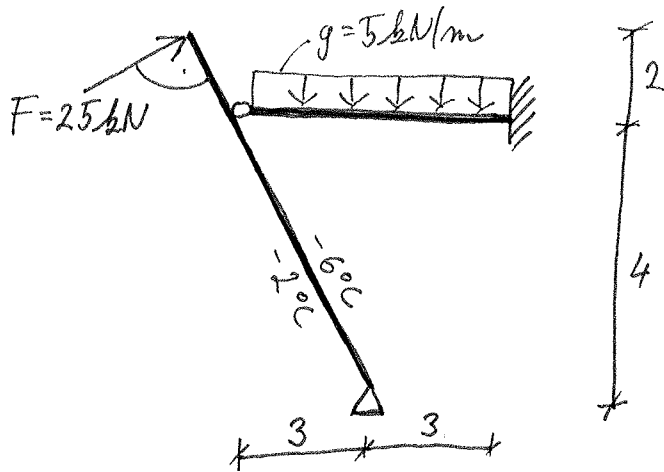
$$[K_{1,3}] = \begin{bmatrix} u_1 & w_1 & \varphi_1 \\ u_3 & w_3 & \varphi_3 \end{bmatrix} ; \{R_{1,3}^*\} = \begin{Bmatrix} X_1^* \\ Z_1^* \\ M_1^* \\ X_3^* \\ Z_3^* \\ M_3^* \end{Bmatrix} ; \{R_{1,3}\} = \begin{Bmatrix} X_1 \\ Z_1 \\ M_1 \\ X_3 \\ Z_3 \\ M_3 \end{Bmatrix}$$

$$[K] = \begin{bmatrix} 85 & 943 & 38 & 400 \\ 38 & 400 & 51 & 212 \end{bmatrix} \begin{Bmatrix} u_1 \\ w_1 \end{Bmatrix} ; \{R\} = \begin{Bmatrix} \text{---} \\ \text{---} \end{Bmatrix} \begin{Bmatrix} X_1 \\ Z_1 \end{Bmatrix} ; \{F\} = \begin{Bmatrix} 9.28 \\ -21.8743 \end{Bmatrix} \begin{Bmatrix} X_1 \\ Z_1 \end{Bmatrix}$$

$$[K] \cdot \{r\} = \{F\}$$

$$u_1 = \frac{\text{del} \begin{bmatrix} \text{---} & \text{---} \end{bmatrix}}{\text{del} [K]} = 4.4938 \cdot 10^{-4} \text{ m} ; w_1 = \frac{\text{del} \begin{bmatrix} \text{---} & \text{---} \end{bmatrix}}{\text{del} [K]} = -7.6410 \cdot 10^{-4} \text{ m}$$

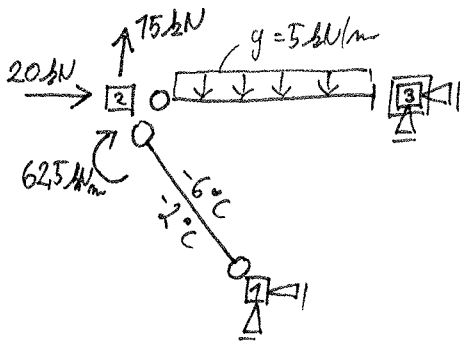
Vyřešte deformační MOC konstrukce.



$$E = 2 \cdot 10^7 \text{ kPa}$$

$$\alpha = 1 \cdot 10^{-5} \text{ } ^\circ\text{C}^{-1}$$

1)



$$N_f = 2 ; \{r\} = \begin{Bmatrix} w_2 \\ w_2 \end{Bmatrix} ; \{S\} = \begin{Bmatrix} 20 \\ -15 \end{Bmatrix} \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix}$$

2) PRUT 2,1

$$e =$$

$$x_{2,1} =$$

$$d =$$

$$c =$$

$$[K_{2,1}] = \begin{bmatrix} u_2 & w_2 & \varphi_2 & u_1 & w_1 & \varphi_1 \\ \hline & & & & & \end{bmatrix} ; \{\bar{R}_{2,1}^*\} = \begin{Bmatrix} + \\ + \\ - \\ - \\ + \\ + \end{Bmatrix} = \begin{Bmatrix} X_2^* \\ Z_2^* \\ M_2^* \\ X_1^* \\ Z_1^* \\ M_1^* \end{Bmatrix} ; \{\bar{R}_{2,1}\} = \begin{Bmatrix} X_2 \\ Z_2 \\ M_2 \\ X_1 \\ Z_1 \\ M_1 \end{Bmatrix}$$

PRUT 2,3

$$e =$$

$$[K_{2,3}] = \begin{bmatrix} u_2 & w_2 & \varphi_2 & u_3 & w_3 & \varphi_3 \\ \hline & & & & & \end{bmatrix} ; \{\bar{R}_{2,3}^*\} = \{\bar{R}_{2,3}\} = \begin{Bmatrix} X_2 \\ Z_2 \\ M_2 \\ X_3 \\ Z_3 \\ M_3 \end{Bmatrix}$$

3)

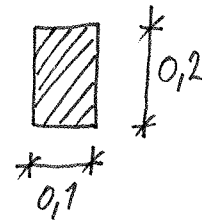
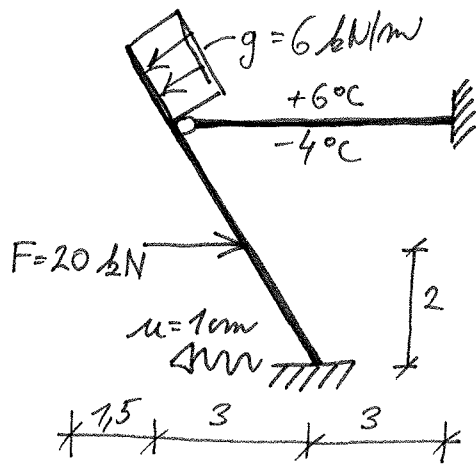
$$[K] = \begin{bmatrix} u_2 & w_2 \\ 95 \ 466 & 38 \ 400 \\ 38 \ 400 & 512 \ 19 \end{bmatrix} \begin{Bmatrix} u_2 \\ w_2 \end{Bmatrix} ; \{\bar{R}\} = \begin{Bmatrix} - \\ - \end{Bmatrix} \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix} ; \{F\} = \begin{Bmatrix} 39,6 \\ 1,55 \end{Bmatrix} \begin{Bmatrix} X_2 \\ Z_2 \end{Bmatrix}$$

$$[K] \cdot \{r\} = \{F\}$$

$$u_2 = \frac{\text{del} \begin{bmatrix} \text{---} / \text{---} \end{bmatrix}}{\text{del} [K]} = 5,7648 \cdot 10^{-4} \text{ m}$$

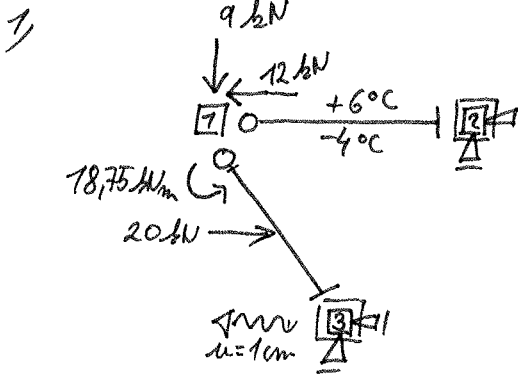
$$w_2 = \frac{\text{del} \begin{bmatrix} \text{---} / \text{---} \end{bmatrix}}{\text{del} [K]} = -4,0194 \cdot 10^{-4} \text{ m}$$

Výřešte deformáční stav konstrukce.



$$E = 2 \cdot 10^7 \text{ Pa}$$

$$\alpha = 1 \cdot 10^{-5} \text{ } ^\circ\text{C}^{-1}$$



$$n_f = 2; \quad \{x\} = \begin{Bmatrix} u_1 \\ w_1 \end{Bmatrix}; \quad \{S\} = \begin{Bmatrix} -12 \\ 9 \end{Bmatrix} \begin{Bmatrix} X_1 \\ Z_1 \end{Bmatrix}$$

2) PRUT 1,2

$$e =$$

$$[K_{1,2}] = \begin{bmatrix} \begin{matrix} u_1 & w_1 & \varphi_1 \\ u_2 & w_2 & \varphi_2 \end{matrix} \end{bmatrix}$$

$$\{\bar{R}_{1,2}\} = \begin{Bmatrix} X_1 \\ Z_1 \\ M_1 \\ X_2 \\ Z_2 \\ M_2 \end{Bmatrix}$$

PRUT 1,3

$$e =$$

$$\delta_{13} =$$

$$\Delta =$$

$$C =$$

$$[K_{1,3}] = \begin{bmatrix} \begin{matrix} u_1 & w_1 & \varphi_1 \\ u_3 & w_3 & \varphi_3 \end{matrix} \end{bmatrix}$$

$$\{\bar{R}_{1,3}^*\} = \begin{Bmatrix} X_1^* \\ Z_1^* \\ M_1^* \\ X_3^* \\ Z_3^* \\ M_3^* \end{Bmatrix}$$

$$\{\bar{R}_{1,3}\} = \begin{Bmatrix} X_1 \\ Z_1 \\ M_1 \\ X_3 \\ Z_3 \\ M_3 \end{Bmatrix}$$

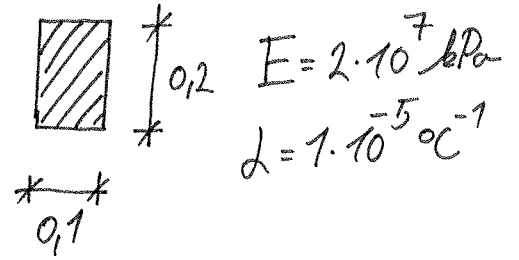
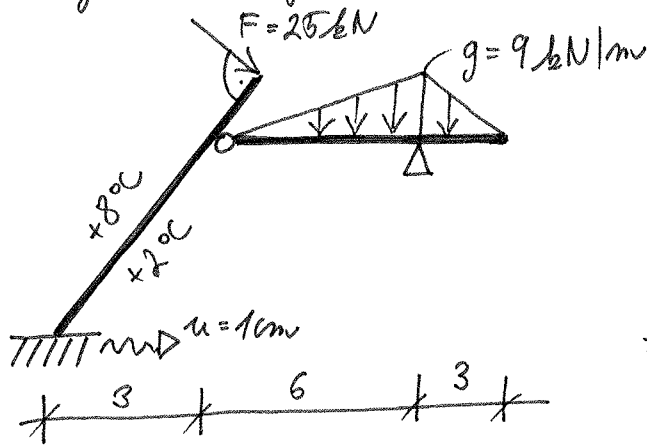
$$[K] = \begin{bmatrix} \begin{matrix} u_1 & w_1 \\ 95 & 487 \\ 38 & 384 \end{matrix} & \begin{matrix} u_1 \\ 38 & 384 \\ 51 & 230 \end{matrix} \end{bmatrix}$$

$$\{\bar{R}\} = \begin{Bmatrix} X_1 \\ Z_1 \end{Bmatrix}; \quad \{\tilde{R}\} = \begin{Bmatrix} X_1 \\ Z_1 \end{Bmatrix}; \quad \{F\} = \begin{Bmatrix} -301,105 \\ -369,505 \end{Bmatrix} \begin{Bmatrix} X_1 \\ Z_1 \end{Bmatrix}$$

$$[K] \cdot \{x\} = \{F\}$$

$$u_1 = \frac{\det \begin{bmatrix} \text{---} & \text{---} \\ \text{---} & \text{---} \end{bmatrix}}{\det [K]} = -3,6341 \cdot 10^{-4} \text{ m}; \quad w_1 = \frac{\det \begin{bmatrix} \text{---} & \text{---} \\ \text{---} & \text{---} \end{bmatrix}}{\det [K]} = -6,9404 \cdot 10^{-3} \text{ m}$$

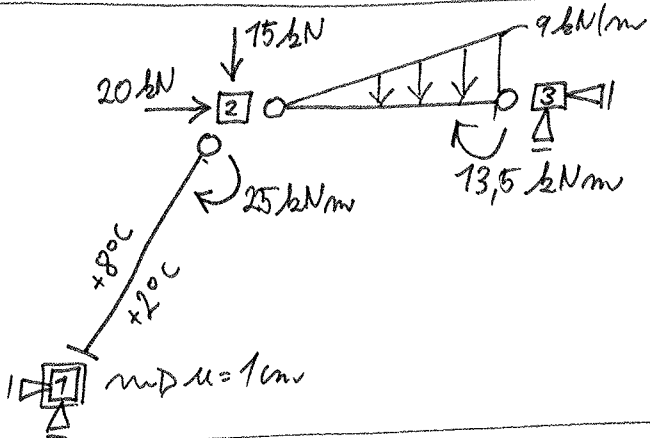
Vyřešte deformační slovo konstrukce.



$$E = 2 \cdot 10^7 \text{ kPa}$$

$$\alpha = 1 \cdot 10^{-5} \text{ } ^\circ\text{C}^{-1}$$

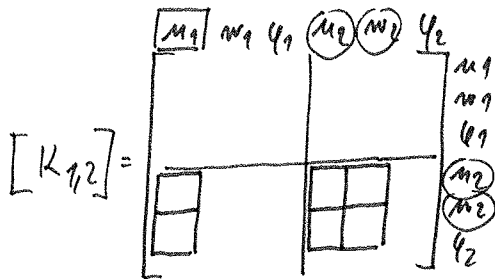
1)



$$n_1 = 2; \{r\} = \begin{Bmatrix} u_2 \\ w_2 \end{Bmatrix}; \{S\} = \begin{Bmatrix} 20 \\ 15 \end{Bmatrix}$$

2) PRUT 1,2

$l =$
 $\delta_{1,2} =$
 $\Delta =$
 $C =$

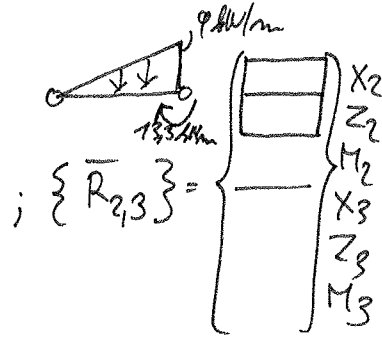
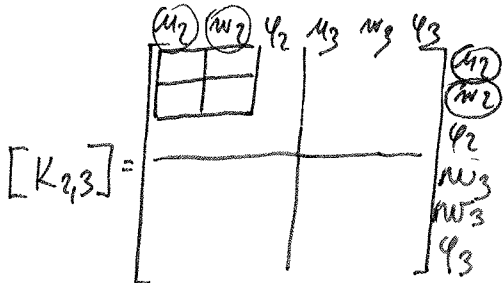


$$\{R_{1,2}^*\} = \begin{Bmatrix} X_1 \\ Z_1 \\ M_1 \\ M_2 \end{Bmatrix}; \{R_{1,2}\} = \begin{Bmatrix} X_1 \\ Z_1 \\ M_1 \\ M_2 \end{Bmatrix}; \{\tilde{R}_{1,2}\} = \begin{Bmatrix} X_1 \\ Z_1 \\ M_1 \\ M_2 \end{Bmatrix}$$

$$\{\tilde{r}_{1,2}\} = \{ \quad ; \quad ; \quad ; \quad \}^T; \{\tilde{R}_{1,2}\} = [K_{1,2}] \cdot \{\tilde{r}_{1,2}\}$$

PRUT 2,3

$l =$



$$\{R_{2,3}\} = \begin{Bmatrix} X_2 \\ Z_2 \\ M_2 \\ M_3 \end{Bmatrix}$$

$$3) [K] = \begin{bmatrix} 95487 & -38384 \\ -38384 & 51212 \end{bmatrix} \begin{matrix} u_2 \\ w_2 \end{matrix}; \{R\} = \begin{Bmatrix} - \\ - \end{Bmatrix} \begin{matrix} X_2 \\ Z_2 \end{matrix}; \{\tilde{R}\} = \begin{Bmatrix} - \\ - \end{Bmatrix} \begin{matrix} X_2 \\ Z_2 \end{matrix}; \{F\} = \begin{Bmatrix} 326,3 \\ -373,52 \end{Bmatrix} \begin{matrix} X_2 \\ Z_2 \end{matrix}$$

$$[K] \cdot \{r\} = \{F\}$$

$$u_2 = \frac{\det \begin{bmatrix} - & - \\ - & - \end{bmatrix}}{\det [K]} = 6,9447 \cdot 10^{-4} \text{ m}; w_2 = \frac{\det \begin{bmatrix} - & - \\ - & - \end{bmatrix}}{\det [K]} = -6,7732 \cdot 10^{-3} \text{ m}$$