

$E = 20 \text{ GPa}$   
 $I = \frac{1}{12} 0,15 \cdot 0,3^3 = 3,375 \cdot 10^{-4} \text{ m}^4$   
 $A = 0,15 \cdot 0,3 = 0,045 \text{ m}^2$

MODEL, VEKTOR NEZNÁMÝCH POSUVŮ  $\{r\}$ , VEKTOR STŘEŽÍKOVÉHO ZATÍŽENÍ  $\{S\}$

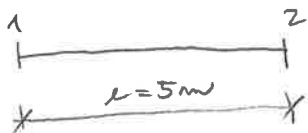


$\{r\} = \begin{Bmatrix} w_2 \\ \phi_2 \end{Bmatrix}, \{S\} = \begin{Bmatrix} 0 \\ -10000 \end{Bmatrix}$

MATICE PRUTŮ

- MATICE TUHOSTI  $[K_{ab}^*]$
- VEKTORY PRITÁRNÍCH KONC. SIL  $\{\bar{R}_{ab}^*\}$

PRUT 1-2



$\frac{EA}{l} = 1,8 \cdot 10^8 \quad \frac{6EI}{l^2} = 1,62 \cdot 10^6$

$\frac{12EI}{l^3} = 6,48 \cdot 10^5 \quad \frac{4EI}{l} = 5,4 \cdot 10^6$

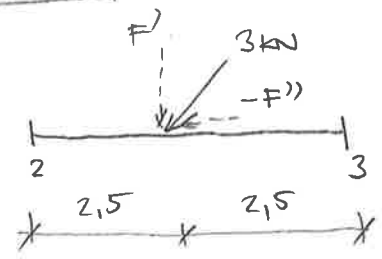
$[K_{12}^*] =$

	$w_1$	$w_1$	$\phi_1$	$w_2$	$w_2$	$\phi_2$	
$X_1$	$1,8 \cdot 10^8$			$-1,8 \cdot 10^8$			
$Z_1$		$6,48 \cdot 10^5$	$-1,62 \cdot 10^6$		$-6,48 \cdot 10^5$	$-1,62 \cdot 10^6$	
$M_1$			$5,4 \cdot 10^6$		$1,62 \cdot 10^6$	$2,7 \cdot 10^6$	
$X_2$				$1,8 \cdot 10^8$			
$Z_2$					$6,48 \cdot 10^5$	$1,62 \cdot 10^6$	
$M_2$						$5,4 \cdot 10^6$	

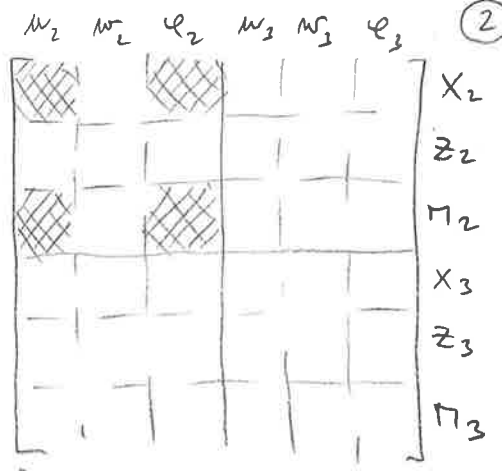
$\{\bar{R}_{12}^*\} = \begin{Bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{Bmatrix} \begin{matrix} X_1 \\ Z_1 \\ M_1 \\ X_2 \\ Z_2 \\ M_2 \end{matrix}$

$\{r_{12}^*\} = \begin{Bmatrix} w_1 \\ w_1 \\ \phi_1 \\ w_2 \\ w_2 \\ \phi_2 \end{Bmatrix}$

PRŮT 2-3



$$[K_{23}^*] = [K_{12}^*] =$$



$$\{R_{23}^*\} = \begin{Bmatrix} 1061 \\ -1061 \\ 1326 \\ 1061 \\ -1061 \\ -1326 \end{Bmatrix} \begin{matrix} X_2 \\ Z_2 \\ M_2 \\ X_3 \\ Z_3 \\ M_3 \end{matrix}$$

$$\{r_{23}^*\} = \begin{Bmatrix} u_2 \\ w_2 \\ \varphi_2 \\ u_3 \\ w_3 \\ \varphi_3 \end{Bmatrix}$$

SESTAVENÍ MATIC MODELU

- MATICE TUHOSTI  $[K]$
- VEKTOR PRŮT. K. SIL  $\{R\}$
- VEKTOR ZATIŽENÍ  $\{F\}$

$$[K] = \begin{matrix} & u_2 & \varphi_2 \\ \begin{matrix} X_2 \\ M_2 \end{matrix} & \begin{bmatrix} 1,8 \cdot 10^8 & 0 \\ 1,8 \cdot 10^8 & 3,6 \cdot 10^8 \end{bmatrix} & \begin{bmatrix} 0 & 0 \\ 5,4 \cdot 10^6 & 10,8 \cdot 10^6 \end{bmatrix} \end{matrix}$$

$$\{R\} = \begin{matrix} X_2 \\ M_2 \end{matrix} \begin{bmatrix} 0 & 1061 \\ 1061 & 1326 \end{bmatrix}$$

$$\{F\} = \{S\} - \{R\} = \begin{Bmatrix} -1061 \\ -11326 \end{Bmatrix}$$

ŘEŠENÍ PODMÍNEK ROVNOVÁH

$$[K]\{v\} = \{F\}; \quad \begin{bmatrix} 3,6 \cdot 10^8 & 0 \\ 0 & 10,8 \cdot 10^6 \end{bmatrix} \begin{Bmatrix} u_2 \\ \varphi_2 \end{Bmatrix} = \begin{Bmatrix} -1061 \\ -11326 \end{Bmatrix}$$

TJ.

$$3,6 \cdot 10^8 \cdot w_2 + 0 \cdot \varphi_2 = -1061$$

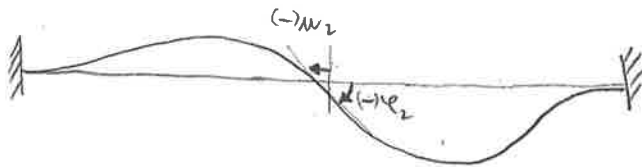
$$w_2 = -\frac{1061}{3,6 \cdot 10^8}$$

$$0 \cdot w_2 + 10,8 \cdot 10^6 \cdot \varphi_2 = -11326$$

$$\varphi_2 = -\frac{11326}{10,8 \cdot 10^6}$$

$$\{r\} = \begin{Bmatrix} -2,947 \cdot 10^{-6} \text{ m} \\ -1,049 \cdot 10^{-3} \text{ rad} \end{Bmatrix} \begin{matrix} w_2 \\ \varphi_2 \end{matrix}$$

DEFORNACE



KONCOVE SÍČY A PŮBĚHY FUNKCÍ VNITŘNÍCH SIL

$$\{\hat{R}_{12}^*\} = [K_{12}^*] \cdot \{r_{12}^*\}, \quad \{r_{12}^*\} = \begin{Bmatrix} 0 \\ 0 \\ 0 \\ -2,95 \cdot 10^{-6} \\ 0 \\ -1,05 \cdot 10^{-3} \end{Bmatrix}; \quad \{\hat{R}_{12}^*\} = \begin{Bmatrix} 530 \\ 1699 \\ -2831 \\ -530 \\ -1699 \\ -5663 \end{Bmatrix}$$

$$\{\hat{R}_{23}^*\} = [K_{23}^*] \cdot \{r_{23}^*\}, \quad \{r_{23}^*\} = \begin{Bmatrix} -2,95 \cdot 10^{-6} \\ 0 \\ -1,05 \cdot 10^{-3} \\ 0 \\ 0 \\ 0 \end{Bmatrix}; \quad \{\hat{R}_{23}^*\} = \begin{Bmatrix} -530 \\ 1699 \\ -5663 \\ 530 \\ -1699 \\ -2831 \end{Bmatrix}$$

$$\{\hat{R}_{12}^*\} = \{\hat{R}_{12}^*\} + \{\hat{R}_{12}^*\} = \{\hat{R}_{12}^*\} = \{0\}$$

$$\{R_{23}^*\} = \{R_{23}^*\} + \{\hat{R}_{22}^*\} = \begin{Bmatrix} 530 & N \\ 638 & N \\ -4337 & N_m \\ 1591 & N \\ -2760 & N \\ -4157 & N_m \end{Bmatrix}$$

