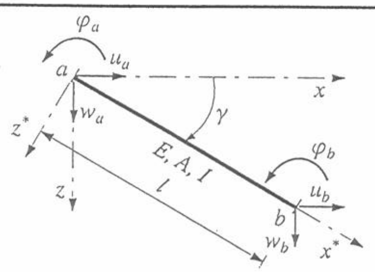
Tabulka 11.4. Globální matice tuhosti prutu konstantního průřezu

(a) Prut oboustranně monoliticky připojený

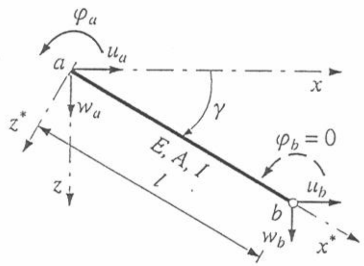
$c = \cos\gamma$
$s = \sin\gamma$



$$
\mathbf{k}_{ab} = \left[\begin{array}{ccc|ccc}
\frac{EA}{l}c^2 + \frac{12EI}{l^3}s^2 & \left(\frac{EA}{l} - \frac{12EI}{l^3}\right)cs & \frac{6EI}{l^2}s & -\left(\frac{EA}{l}c^2 + \frac{12EI}{l^3}s^2\right) & -\left(\frac{EA}{l} - \frac{12EI}{l^3}\right)cs & \frac{6EI}{l^2}s \\
\left(\frac{EA}{l} - \frac{12EI}{l^3}\right)cs & \frac{EA}{l}s^2 + \frac{12EI}{l^3}c^2 & -\frac{6EI}{l^2}c & -\left(\frac{EA}{l} - \frac{12EI}{l^3}\right)cs & -\left(\frac{EA}{l}s^2 + \frac{12EI}{l^3}c^2\right) & -\frac{6EI}{l^2}c \\
\frac{6EI}{l^2}s & -\frac{6EI}{l^2}c & \frac{4EI}{l} & -\frac{6EI}{l^2}s & \frac{6EI}{l^2}c & \frac{2EI}{l} \\
\hline
-\left(\frac{EA}{l}c^2 + \frac{12EI}{l^3}s^2\right) & -\left(\frac{EA}{l} - \frac{12EI}{l^3}\right)cs & -\frac{6EI}{l^2}s & \frac{EA}{l}c^2 + \frac{12EI}{l^3}s^2 & \left(\frac{EA}{l} - \frac{12EI}{l^3}\right)cs & -\frac{6EI}{l^2}s \\
-\left(\frac{EA}{l} - \frac{12EI}{l^3}\right)cs & -\left(\frac{EA}{l}s^2 + \frac{12EI}{l^3}c^2\right) & \frac{6EI}{l^2}c & \left(\frac{EA}{l} - \frac{12EI}{l^3}\right)cs & \frac{EA}{l}s^2 + \frac{12EI}{l^3}c^2 & \frac{6EI}{l^2}c \\
\frac{6EI}{l^2}s & -\frac{6EI}{l^2}c & \frac{2EI}{l} & -\frac{6EI}{l^2}s & \frac{6EI}{l^2}c & \frac{4EI}{l}
\end{array}\right]
$$

(b) Prut pravostranně kloubově připojený

$c = \cos\gamma$
$s = \sin\gamma$

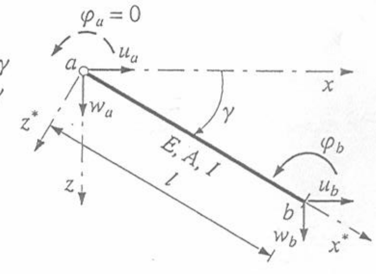


$$
\mathbf{k}_{ab} = \left[\begin{array}{ccc|ccc}
\frac{EA}{l}c^2 + \frac{3EI}{l^3}s^2 & \left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & \frac{3EI}{l^2}s & -\left(\frac{EA}{l}c^2 + \frac{3EI}{l^3}s^2\right) & -\left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & 0 \\
\left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & \frac{EA}{l}s^2 + \frac{3EI}{l^3}c^2 & -\frac{3EI}{l^2}c & -\left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & -\left(\frac{EA}{l}s^2 + \frac{3EI}{l^3}c^2\right) & 0 \\
\frac{3EI}{l^2}s & -\frac{3EI}{l^2}c & \frac{3EI}{l} & -\frac{3EI}{l^2}s & \frac{3EI}{l^2}c & 0 \\
\hline
-\left(\frac{EA}{l}c^2 + \frac{3EI}{l^3}s^2\right) & -\left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & -\frac{3EI}{l^2}s & \frac{EA}{l}c^2 + \frac{3EI}{l^3}s^2 & \left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & 0 \\
-\left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & -\left(\frac{EA}{l}s^2 + \frac{3EI}{l^3}c^2\right) & \frac{3EI}{l^2}c & \left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & \frac{EA}{l}s^2 + \frac{3EI}{l^3}c^2 & 0 \\
0 & 0 & 0 & 0 & 0 & 0
\end{array}\right]
$$

Tabulka 11.4. Globální matice tuhosti prutu konstantního průřezu (pokračování)

(c) Prut levostranně kloubově připojený

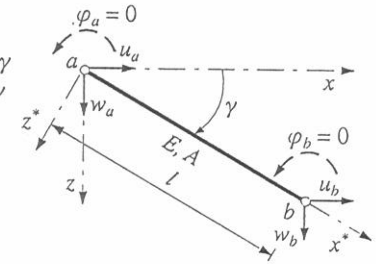
$c = \cos\gamma$
$s = \sin\gamma$



$$
\mathbf{k}_{ab} = \left[\begin{array}{ccc|ccc}
\frac{EA}{l}c^2 + \frac{3EI}{l^3}s^2 & \left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & 0 & -\left(\frac{EA}{l}c^2 + \frac{3EI}{l^3}s^2\right) & -\left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & \frac{3EI}{l^2}s \\
\left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & \frac{EA}{l}s^2 + \frac{3EI}{l^3}c^2 & 0 & -\left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & -\left(\frac{EA}{l}s^2 + \frac{3EI}{l^3}c^2\right) & -\frac{3EI}{l^2}c \\
0 & 0 & 0 & 0 & 0 & 0 \\
\hline
-\left(\frac{EA}{l}c^2 + \frac{3EI}{l^3}s^2\right) & -\left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & 0 & \frac{EA}{l}c^2 + \frac{3EI}{l^3}s^2 & \left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & -\frac{3EI}{l^2}s \\
-\left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & -\left(\frac{EA}{l}s^2 + \frac{3EI}{l^3}c^2\right) & 0 & \left(\frac{EA}{l} - \frac{3EI}{l^3}\right)cs & \frac{EA}{l}s^2 + \frac{3EI}{l^3}c^2 & \frac{3EI}{l^2}c \\
\frac{3EI}{l^2}s & -\frac{3EI}{l^2}c & 0 & -\frac{3EI}{l^2}s & \frac{3EI}{l^2}c & \frac{3EI}{l}
\end{array}\right]
$$

(d) Prut oboustranně kloubově připojený

$c = \cos\gamma$
$s = \sin\gamma$



$$
\mathbf{k}_{ab} = \frac{EA}{l}\left[\begin{array}{ccc|ccc}
c^2 & cs & 0 & -c^2 & -cs & 0 \\
cs & s^2 & 0 & -cs & -s^2 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 \\
\hline
-c^2 & -cs & 0 & c^2 & cs & 0 \\
-cs & -s^2 & 0 & cs & s^2 & 0 \\
0 & 0 & 0 & 0 & 0 & 0
\end{array}\right]
$$

K výpočtu lokálních koncových sil z globálních parametrů deformace:

$$
\hat{\mathbf{R}}^*_{ab} = \mathbf{k}^*_{ab}\mathbf{r}^*_{ab} = \mathbf{k}^*_{ab}\mathbf{T}_{ab}\mathbf{r}_{ab} = \frac{EA}{l}\left[\begin{array}{ccc|ccc}
c & s & 0 & -c & -s & 0 \\
0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 \\
\hline
-c & -s & 0 & c & s & 0 \\
0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0
\end{array}\right]\mathbf{r}_{ab}
$$