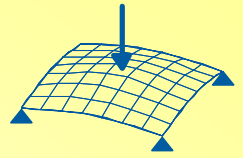


Hookesches Gesetz



Ebener Spannungszustand:

$$\varepsilon_x = \frac{1}{E}(\sigma_x - \nu\sigma_y)$$

$$\varepsilon_y = \frac{1}{E}(\sigma_y - \nu\sigma_x)$$

$$\gamma_{xy} = \frac{1}{G}\tau_{xy}$$

$$\sigma_x = \frac{E}{1-\nu^2}(\varepsilon_x + \nu\varepsilon_y)$$

$$\sigma_y = \frac{E}{1-\nu^2}(\varepsilon_y + \nu\varepsilon_x)$$

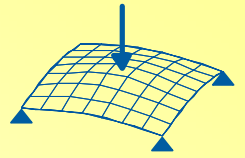
$$\tau_{xy} = G\gamma_{xy}$$

Matrizendarstellung:

$$\begin{pmatrix} \varepsilon_x \\ \varepsilon_y \\ \gamma_{xy} \end{pmatrix} = \begin{bmatrix} \frac{1}{E} & -\frac{\nu}{E} & 0 \\ -\frac{\nu}{E} & \frac{1}{E} & 0 \\ 0 & 0 & \frac{1}{G} \end{bmatrix} \begin{pmatrix} \sigma_x \\ \sigma_y \\ \tau_{xy} \end{pmatrix}$$

$$\begin{pmatrix} \sigma_x \\ \sigma_y \\ \tau_{xy} \end{pmatrix} = \begin{bmatrix} \frac{E}{1-\nu^2} & \frac{E\nu}{1-\nu^2} & 0 \\ \frac{E\nu}{1-\nu^2} & \frac{E}{1-\nu^2} & 0 \\ 0 & 0 & G \end{bmatrix} \begin{pmatrix} \varepsilon_x \\ \varepsilon_y \\ \gamma_{xy} \end{pmatrix}$$

Hookesches Gesetz



Räumliche Probleme:

$$\varepsilon_x = \frac{1}{E} \left[\sigma_x - \nu (\sigma_y + \sigma_z) \right] + \alpha_T \Delta T$$

$$\varepsilon_y = \frac{1}{E} \left[\sigma_y - \nu (\sigma_x + \sigma_z) \right] + \alpha_T \Delta T$$

$$\varepsilon_z = \frac{1}{E} \left[\sigma_z - \nu (\sigma_x + \sigma_y) \right] + \alpha_T \Delta T$$

$$\gamma_{xy} = \frac{1}{G} \tau_{xy}, \quad \gamma_{xz} = \frac{1}{G} \tau_{xz}, \quad \gamma_{yz} = \frac{1}{G} \tau_{yz},$$