Matrixdarstellung der Spannungs-Verzerrungs-Beziehungen im isotropen Fall: $\sigma = D\varepsilon$

1. σ-ε-Relation mit 9-Komponentigen Vektoren:

$$\sigma = [\sigma_{11}, \sigma_{22}, \sigma_{33}, \sigma_{12}, \sigma_{21}, \sigma_{23}, \sigma_{32}, \sigma_{13}, \sigma_{31}]^T \in \mathbb{R}^9$$
$$\varepsilon = [\varepsilon_{11}, \varepsilon_{22}, \varepsilon_{33}, \varepsilon_{12}, \varepsilon_{21}, \varepsilon_{23}, \varepsilon_{32}, \varepsilon_{12}, \varepsilon_{31}]^T \in \mathbb{R}^9$$

$$D = \begin{bmatrix} \lambda+2\mu & \lambda & \lambda & & & & & & \\ \lambda & \lambda+2\mu & \lambda & & & & & & \\ \lambda & \lambda & \lambda+2\mu & & & & & & \\ & & & 2\mu & & & & & \\ & & & & 2\mu & & & & \\ & & & & & 2\mu & & & \\ & & & & & & 2\mu & & \\ & & & & & & & 2\mu & \\ & & & & & & & & 2\mu \end{bmatrix}$$

2. σ-ε-Relation mit 6-Komponentigen Vektoren:

$$\sigma = [\sigma_{11}, \sigma_{22}, \sigma_{33}, \sigma_{12}, \sigma_{23}, \sigma_{31}]^T \in \mathbb{R}^6 \cong \mathbb{R}^9_S$$
$$\varepsilon = [\varepsilon_{11}, \varepsilon_{22}, \varepsilon_{33}, \gamma_{12}, \gamma_{23}, \gamma_{31}]^T \in \mathbb{R}^6 \triangleq \mathbb{R}^9_S$$

mit $\gamma_{12} = 2\varepsilon_{12}$, $\gamma_{23} = 2\varepsilon_{23}$, $\gamma_{31} = 2\varepsilon_{31}$

$$D = \begin{bmatrix} \lambda+2\mu & \lambda & \lambda & & & \\ \lambda & \lambda+2\mu & \lambda & & & \\ \lambda & \lambda & \lambda+2\mu & & & \\ & & & \mu & & \\ & & & & \mu & \\ & & & & & \mu \end{bmatrix} = \frac{E}{(1+\nu)(1-2\nu)} \begin{bmatrix} 1-\nu & \nu & \nu & & & \\ \nu & 1-\nu & \nu & & & \\ \nu & \nu & 1-\nu & & & \\ & & & \frac{1-2\nu}{2} & & \\ & & & & \frac{1-2\nu}{2} & \\ & & & & & \frac{1-2\nu}{2} \end{bmatrix}$$