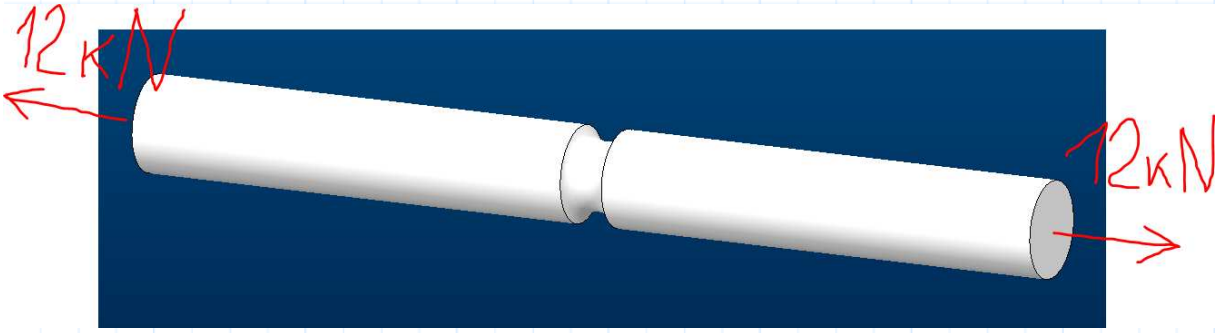
Plasticity Corrections for Elastic Analysis Results: Neuber Method

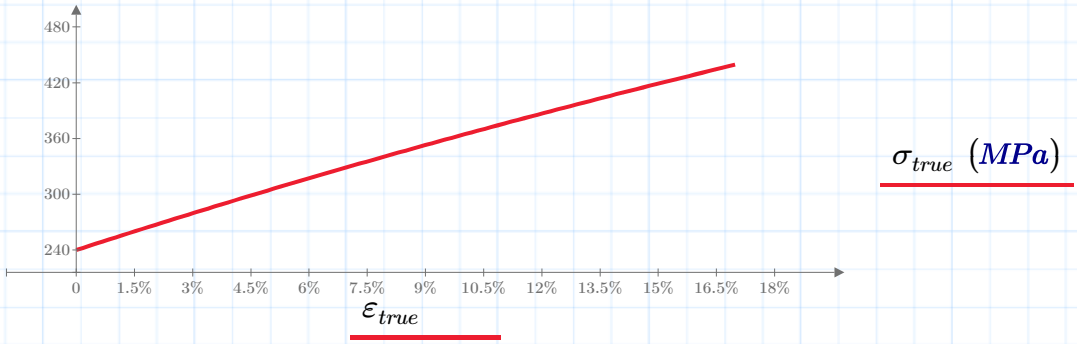
1. Load 12 kN



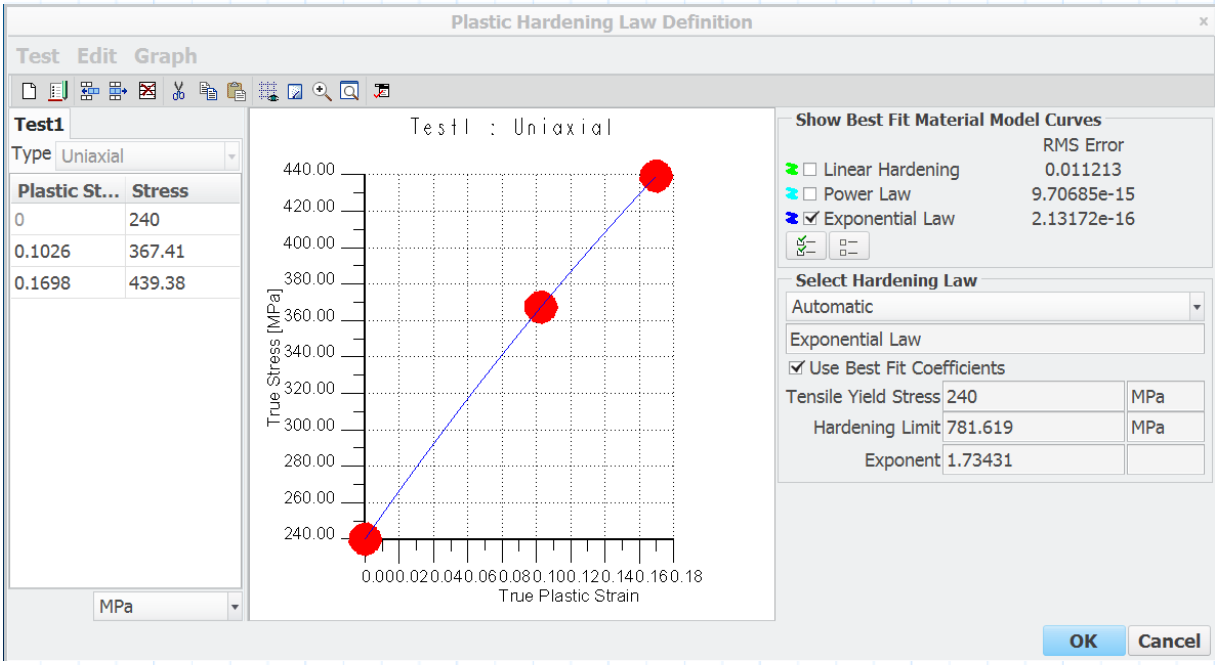
2. Material S235

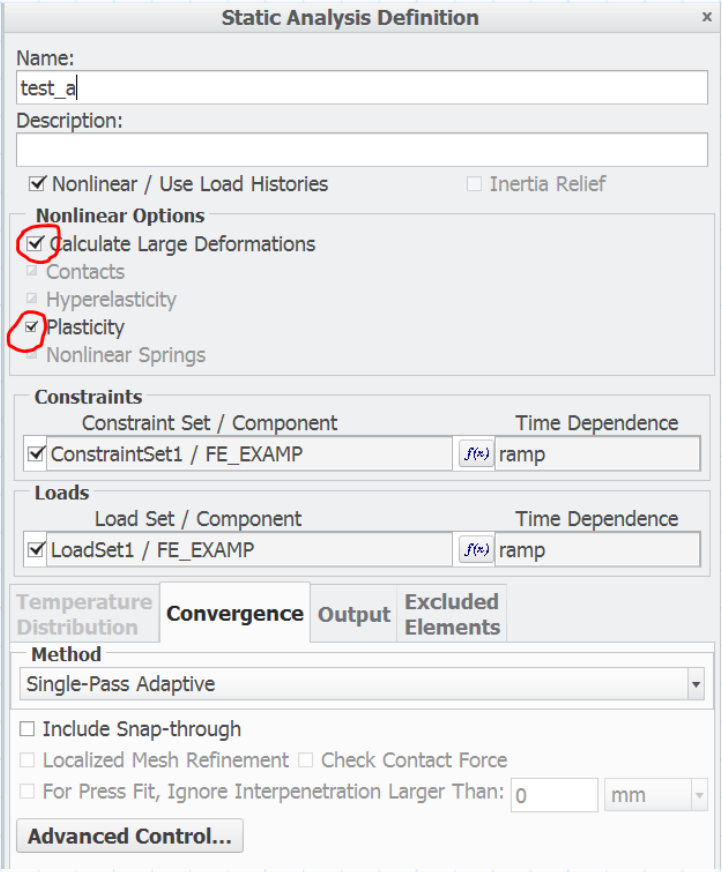
$$f := \text{READEXCEL}(\text{“..\..\..\0\_FEM\neuber\mat\_curve.xlsx”}, \text{“Tabelle1!A1:B101”})$$

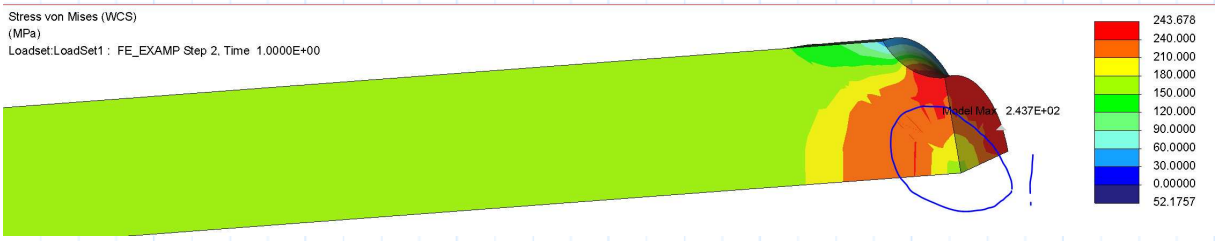
$$\varepsilon_{true} := f^{\langle 0 \rangle} = \begin{bmatrix} 0 \\ 0.17\% \\ 0.34\% \\ 0.509\% \\ 0.679\% \\ 0.849\% \\ 1.019\% \\ 1.189\% \\ 1.358\% \\ 1.528\% \\ 1.698\% \\ 1.868\% \\ \vdots \end{bmatrix} \qquad \sigma_{true} := f^{\langle 1 \rangle} \cdot MPa = \begin{bmatrix} 240 \\ 242.298 \\ 244.59 \\ 246.875 \\ 249.153 \\ 251.424 \\ 253.689 \\ 255.947 \\ 258.199 \\ 260.444 \\ 262.682 \\ 264.914 \\ \vdots \end{bmatrix} MPa$$



3. Creo Simulate non-linear

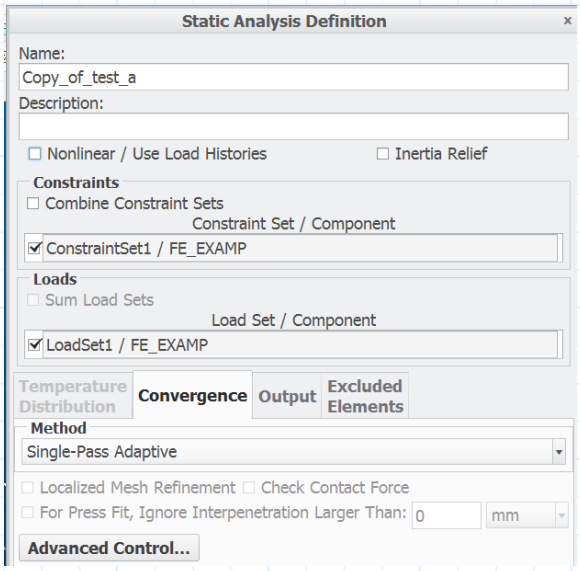


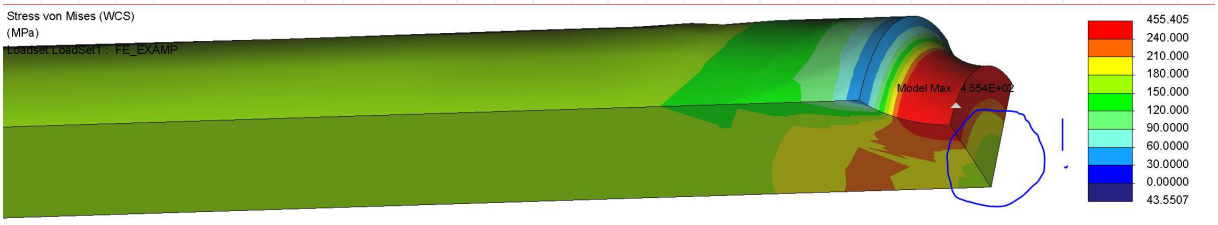




$\sigma_{vm\_true} := 244\ MPa$

4. Creo Simulate linear

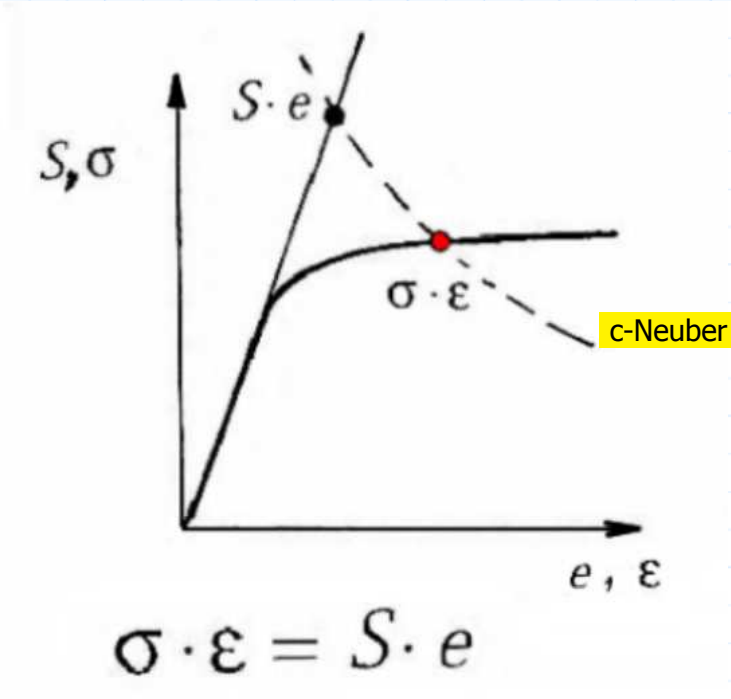




$\sigma_{vm\_max} := 455\ MPa$

$E := 210000\ MPa$

5. Neuber Method



$$\sigma \cdot \varepsilon = \frac{\sigma_{vm\_max}^{2}}{E}$$

$\sigma_{vm\_max} = 455\ MPa$

$$c := \frac{\sigma_{vm\_max}^{2}}{E} = 0.986\ MPa$$

$c_1 := \sigma_{true}^{\widehat{1}} \cdot \varepsilon_{true}^{\widehat{1}} = 0.411\ MPa$

$\sigma_{true}^{\widehat{1}} = [242.298]\ MPa$

$c_2 := \sigma_{true}^{\widehat{2}} \cdot \varepsilon_{true}^{\widehat{2}} = 0.831\ MPa$

$\sigma_{true}^{\widehat{2}} = [244.59]\ MPa$

$c = 0.986\ MPa$

$\sigma_{vm\_neuber} = (244 - 246)\ MPa$

$c_3 := \sigma_{true}^{\widehat{3}} \cdot \varepsilon_{true}^{\widehat{3}} = 1.258\ MPa$

$\sigma_{true}^{\widehat{3}} = [246.875]\ MPa$

$\sigma_{vm\_true} = 244\ MPa$