

Bemerkung 4.34: Elementweise Assemblierung (II)

$$\begin{aligned}\tilde{A}_{ij}^{(m)} &= \int_{\hat{K}} \nabla_x \varphi_{r_j}(F(\hat{x})) \cdot \nabla_x \varphi_{r_i}(F(\hat{x})) |\det(DF(\hat{x}))| d\hat{x} \\ &= \int_{\hat{K}} B^{-T} \nabla_{\hat{x}} (\varphi_{r_j}(F(\hat{x}))) \cdot B^{-T} \nabla_{\hat{x}} (\varphi_{r_i}(F(\hat{x}))) |\det B| d\hat{x} \\ &= \int_{\hat{K}} B^{-T} \nabla_{\hat{x}} \tilde{\varphi}_{r_j}(\hat{x}) \cdot B^{-T} \nabla_{\hat{x}} \tilde{\varphi}_{r_i}(\hat{x}) |\det B| d\hat{x} \\ &= \int_{\hat{K}} B^{-T} \nabla_{\hat{x}} N_j(\hat{x}) \cdot B^{-T} \nabla_{\hat{x}} N_i(\hat{x}) |\det B| d\hat{x}\end{aligned}$$

mit den Formfunktionen

$$\tilde{\varphi}_{r_i}(\hat{x}) := \varphi_{r_i}(F(\hat{x})) = N_i(\hat{x}), \quad (\hat{x} \in \hat{K})$$

und $B = (b^{(1)}, b^{(2)})$ mit $b^{(1)} := a^{(2)} - a^{(1)}$, $b^{(2)} := a^{(3)} - a^{(1)}$.

$$\tilde{A}_{ij}^{(m)} = \int_{\hat{K}} C \nabla_{\hat{x}} N_j(\hat{x}) \cdot \nabla_{\hat{x}} N_i(\hat{x}) |\det B| d\hat{x} \quad \text{mit} \quad C := (B^T B)^{-1}.$$

