- Zur Berechnung von $\underline{f}^{(r)}$ und $K^{(r)}$, $r = \overline{1, R_h}$ für Modellproblem (4) = Variationformulierung von (1):

(4) Ges. $u \in V_g := \{ v \in V := H^1(\Omega) : v = g_1 \text{ auf } \Gamma_1 \}$:

$$a(u, v) = \langle F, v \rangle \quad \forall v \in V_0$$

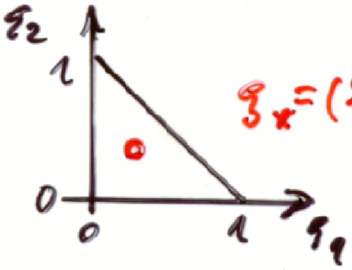
$$\underbrace{\int_\Omega \left[\lambda_1 \frac{\partial u}{\partial x_1}\frac{\partial v}{\partial x_1} + \lambda_2 \frac{\partial u}{\partial x_2}\frac{\partial v}{\partial x_2} + a u v\right] dx}_{2.} + \underbrace{\int_{\Gamma_3} \alpha u v \, ds}_{RB} = \underbrace{\int_\Omega f v \, dx}_{1.} + \underbrace{\int_{\Gamma_2} g_2 v \, ds}_{RB} + \underbrace{\int_{\Gamma_3} \alpha g_3 v \, ds}_{RB}$$

1. Elementlastvektor $\underline{f}^{(r)} = [f_\alpha^{(r)}]_{\alpha \in A_r = A = \{1,2,3\}}$:

$$f_\alpha^{(r)} = \int_{\delta_r} f(x)\, \varphi_\alpha^{(r)}(x)\, dx$$

$$\underset{\delta_r \to \Delta}{=} \int_\Delta f(x_{\delta_r}(\xi))\, \Phi_\alpha(\xi)\, \underbrace{|J_r|}_{= |\det J_r|}\, d\xi$$

$$\underset{\text{numerische Integration}}{\approx} f(x_{\delta_r}(\xi_*))\, \Phi_\alpha(\xi_*)\, |J_r|\, \underbrace{\operatorname{meas} \Delta}_{=: \frac{1}{2}}$$



$\xi_* = (\frac{1}{3}, \frac{1}{3})$

$$\boxed{f_\alpha^{(r)} := f(x_{\delta_r}(\xi_*))\, \Phi_\alpha(\xi_*)\, |J_r| \cdot \frac{1}{2}}$$