Galerkin-Schema:

$(4)_h$ $\boxed{\text{Ges. } u_h \in \tilde{V}_{gh} : a(u_h, v_h) = \langle F, v_h \rangle \quad \forall v_h \in \hat{V}_{0h}}$

$\Updownarrow$

$\leftarrow$ (8) $u_h(x) = \sum_{i=1}^{N_h} u_i \varphi_i(x) + \sum_{i=N_h+1}^{\bar{N}_h} g_1(x_i) \varphi_i(x)$

einsetzen in $(4)_h$ und

testen mit allen $v_h = \varphi_k$, $k \in \omega_h = \{1, \dots, N_h\}$:

$$a\Big(\sum_{i \in \omega_h} u_i \varphi_i + \sum_{i \in \gamma_h} g_1(x_i) \varphi_i, \varphi_k\Big) = \langle F, \varphi_k \rangle$$

$$\sum_{i \in \omega_h} u_i\, a(\varphi_i, \varphi_k) + \sum_{i \in \gamma_h} g_1(x_i)\, a(\varphi_i, \varphi_k) = \langle F, \varphi_k \rangle$$

$\underline{(4)}_h$ Ges. $\underline{u}_h = [u_i]_{i \in \omega_h} \in \mathbb{R}^{N_h}$:

$$\sum_{i \in \omega_h} u_i\, a(\varphi_i, \varphi_k) = \langle F, \varphi_k \rangle - \sum_{i \in \gamma_h} g_1(x_i)\, a(\varphi_i, \varphi_k) \quad \forall k \in \omega_h$$

$$K_h \underline{u}_h = \underline{f}_h,$$

wobei $K_h = [a(\varphi_i, \varphi_k)]_{k, i \in \omega_h}$ – Steifigkeitsmatrix

$\underline{f}_h = \Big[\langle F, \varphi_k \rangle - \sum_{i \in \gamma_h} g_1(x_i)\, a(\varphi_i, \varphi_k)\Big]_{k \in \omega_h} \in \mathbb{R}^{N_h}$