ansatz function $\neq$ test func.

■ Two Galerkin – Petrov – Schemes:

(7)$_{Box}$

$$\boxed{\begin{aligned}&\text{Find } u_B = \sum_{i\in\omega_h} u^{(i)} p^{(i)}(x) \in V_{0h} = \mathring{P}_1(\mathcal{T}_\Delta) \subset V_0 :\\ &\bar{a}(u_B, \bar{v}) = (f, \bar{v})_0 \quad \forall \bar{v} \in T_{0h} = \mathring{P}_0(\mathcal{T}_\chi) \not\subset V_0\end{aligned}}$$

with $\bar{a}(\cdot,\cdot) = a_h(\cdot,\cdot) : V_{0h} \times T_{0h} \to \mathbb{R}^1$ – discrete bilinear form that can be defined as follows:

a) A real Galerkin – Petrov Scheme:

$$\bar{a}(u_B, \bar{v}) := -\sum_{j\in\omega_h} \oint_{\partial\mathcal{X}(x^{(j)})} a(x) \frac{\partial u_B}{\partial n}(x)\, \bar{v}(x)\, ds + (c u_B, \bar{v})_0$$

b) A lumped Galerkin – Petrov Scheme:

$$\bar{a}(u_B, \bar{v}) := -\sum_{j\in\omega_h} \oint_{\partial\mathcal{X}(x^{(j)})} a(x) \frac{\partial u_B}{\partial n}(x)\, \bar{v}(x)\, ds + (c \bar{u}_B, \bar{v})_0$$

where

$$V_{0h} \ni u_B(x) = \sum_{i\in\omega_h} u^{(i)} p^{(i)}(x) \longleftrightarrow \bar{u}_B(x) = \sum_{i\in\omega_h} u^{(i)} \chi^{(i)}(x) \in T_{0h}$$

isomorphism

$$\underline{u}_B = [u^{(i)}]_{i\in\omega_h} \in R^N$$