

- Adaptive FEM (AFEM) is based on such a posteriori estimates:

SOLVE $\Rightarrow$ ESTIMATE $\Rightarrow$ MARK $\Rightarrow$ REFINES / COARSEN

SOLVE: $u_h \in \tilde{V}_h: a(u_h, v_h) = \langle F, v_h \rangle \forall v_h \in \tilde{V}_h$
 $\Downarrow$
 $u_h \in \mathbb{R}^{N_h}: K_h u_h = f_h$

ESTIMATE: i.e. compute

$$\eta_K = \eta_K(u_h) := h_K \|f + u_h''\|_{0,T_K} \quad \forall K \in \overline{1:N_h}$$

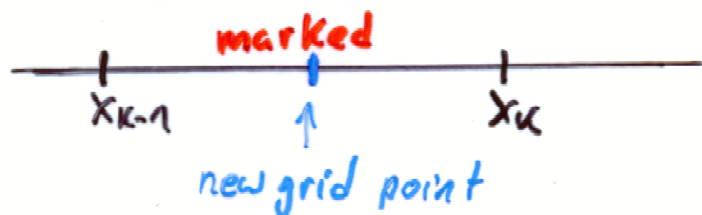
$$\Rightarrow \|u - u_h\|_1 \leq \frac{C_I}{\mu_1} \eta(u_h)$$

$$\text{with } \eta(u_h) := \sqrt{\sum_{K=1}^{N_h} \eta_K^2(u_h)}$$

STOP if $C_I \mu_1^{-1} \eta(u_h) \leq \varepsilon \|u_h\|_1$

MARK: all elements $T_K: \eta_K(u_h) \geq \theta \max_{\ell \in \overline{1:N_h}} \eta_\ell(u_h)$
 e.g. with $\theta = 0.7$

REFINE: all marked elements



new grid