Adaptive Mesh Refinement (~ Coarsening)

on the basis of the local error estimator

$$\eta_r(u_h) := \left[h_r^2 \, \| R_h(u_h) \|^2_{L_2(\delta_r)} + \frac{1}{2} \sum_{e \in \partial\delta_r \setminus \Gamma_D} h_e \, \| R_e(u_h) \|^2_{L_2(e)} \right]$$

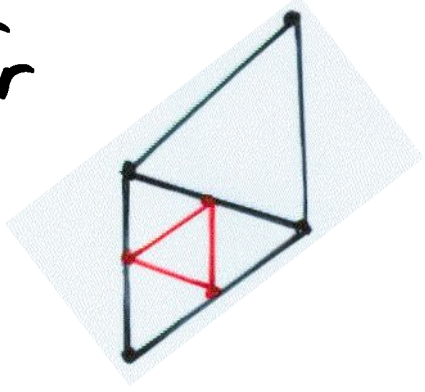
$r \in \mathbb{R}_h$

The principle of the uniform distribution of these local errors leads to the following ALGORITHM: AFEM

- Mark all δ_r : $\eta_r(u_h) \geq \theta \max_{q \in \mathbb{R}_h} \eta_q(u_h)$

  e.g. with $\theta = 0.7$

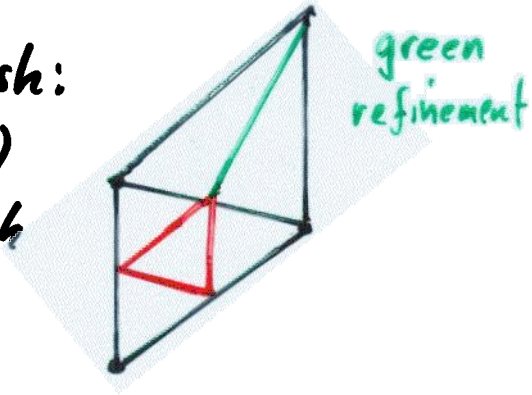
- Refine all marked δ_r



red refinement

- Ensure the conformity of the mesh

  Rule ensuring the shape regularity of the mesh:
  "Do halven (bisect) an angle of the mesh only once!"



green refinement

- New FE-calculation with the new mesh