but 3+6 unknown function in 3D!

2. Reformulation of (2) as a Mixed VP with Perturbation (or Penalty) Term (cf. Subsection 2.3: T 15-18) by introducing the hydrostatic pressure

(23) $$p = \lambda \operatorname{div}(u) = \lambda \varepsilon_{ii}(u)$$

as a new unknown function ($\rightsquigarrow$ only 4 unk. functions!)

■ Reformulation as MVF with Perturbation Term:

- Starting Point: = PVF (2)

(2) Find $u \in \bar{V}_0$: $\underbrace{\lambda(\operatorname{div} u, \operatorname{div} v)_0}_{= p} + 2\mu(\varepsilon(u), \varepsilon(v))_0 = \langle F, v\rangle \; \forall v \in \bar{V}_0$

- Idea: We introduce the new unknown

(23) $p = \lambda \operatorname{div} u = \lambda \varepsilon_{ii}(u) =$ hydrostatic pressure

in the PVF (2). Then (2) + (23) gives the following MVF w PT ($\text{meas}_2 \Gamma_u > 0$, but $\Gamma_u \neq \Gamma$):

(24) $$\boxed{\begin{array}{l} \text{Find } (u,p) \in X \times \Lambda = H^1_{0,\Gamma_u}(\Omega) \times L_2(\Omega): \\ 2\mu(\varepsilon(u), \varepsilon(v))_0 + (\operatorname{div} v, p)_0 = \langle F, v\rangle \quad \forall v \in H^1_{0,\Gamma_u}(\Omega) \\ (\operatorname{div} u, q)_0 \qquad - \frac{1}{\lambda}(p,q)_0 = 0 \quad \forall q \in L_2(\Omega) \end{array}}$$

$\frac{1}{\lambda} \Downarrow t^2$