- **Remark:**

1. First BVP, i.e. $\Gamma_u = \Gamma$:
In the case $H^1_{0,\Gamma_u}(\Omega) = (\overset{\circ}{H}{}^1(\Omega))^3$, the second equation of (24) gives, for $q = 1 \in L_2(\Omega)$:
$\frac{1}{\lambda}(p,1) = (\operatorname{div} u, 1) = \int_\Omega \operatorname{div} u \, dx = -0 + \int_\Gamma \underset{=0}{u \cdot n} \, ds = 0$, i.e.

(25) $\int_\Omega p \, dx = 0$ in the case of the 1st BVP.

Therefore, $\Lambda_0 = \{p \in L_2(\Omega) : \int_\Omega p \, dx = (p,1)_0 = 0\} = L_2(\Omega)|_{\mathbb{R}}$
with $\|p\|_{\Lambda_0} := \|p\|_0 := \inf_{c \in \mathbb{R}} \|p + c\|_0$

2. Second BVP, i.e. $\Gamma_u = \emptyset$:
$H^1_{0,\Gamma_u}(\Omega) = \{v \in (H^1(\Omega))^3 : (v,r)_0 = 0 \ \forall r \in \mathcal{R}\} = \tilde{H}^1(\Omega)$
rigid body motions

- (24) can be written as abstract mixed variational problem (2.34) with perturbation terms

(24)
$$\boxed{\begin{array}{l}
\text{Find } u \in X = H^1_{0,\Gamma_u}(\Omega) \text{ and } p \in \Lambda = \Lambda_0 = L_2(\Omega): \\
a(u,v) + b(v,p) = \langle F, v\rangle \quad \forall v \in X, \\
b(u,q) - t^2 c(p,q) = \langle G, q\rangle \quad \forall q \in \Lambda, \\
\text{with} \\
a(u,v) := 2\mu(\varepsilon(u), \varepsilon(v))_0, \\
b(v,p) := (\operatorname{div} v, p)_0, \\
c(p,q) := (p,q)_0, \quad t^2 = 1/\lambda = \frac{1+\nu}{E}(1-2\nu), \\
\langle F, v\rangle := \int_\Omega f^T v \, dx + \int_{\Gamma_t} t^T v \, ds \\
\langle G, q\rangle := 0
\end{array}}$$