The incompressibility limit $\lambda \to \infty$ $(\nu \to \frac{1}{2})$:

- The theory of MVFwPT (cf. Subsection 2.3) gives the uniforme convergence

(27) $$\begin{pmatrix} u(t) \\ p(t) \end{pmatrix} := L^{-1}(t) \begin{pmatrix} F \\ G \end{pmatrix} \xrightarrow[t = \lambda^{-1/2} \to 0]{\text{uniformely}} \begin{pmatrix} u(0) \\ p(0) \end{pmatrix} := L^{-1}(0) \begin{pmatrix} F \\ G \end{pmatrix}$$

in $X \times \Lambda$, where $(u(0), p(0)) \in X \times \Lambda$ is the solution for incompressible materials $(\nu = 1/2)$:

(28) $$\boxed{\begin{array}{l} \text{Find } u = u(0) \in X \text{ and } p = p(0) \in \Lambda: \\ 2\mu\,(\varepsilon(u), \varepsilon(v))_0 + (\operatorname{div} v, p)_0 = \langle F, v \rangle \quad \forall v \in X \\ (\operatorname{div} u, q)_0 \qquad\qquad\qquad\qquad = 0 \quad \forall q \in \Lambda \end{array}}$$

- <u>Exercise 3.12</u>:
  Prove (27) with the help of the results of Theorem 2.13!

- <u>Remark:</u> (28) is very similar to STOKES:

<u>Incompressible elasticit (28)</u> — <u>STOKES problem</u>

$$\begin{array}{ccc} a(u,v) & \longmapsto & a(u,v) \\ \| & & \| \\ 2\mu\,(\varepsilon(u), \varepsilon(v))_0 & \underset{\text{KORN}}{\approx} & \nu\,(\nabla u, \nabla v)_0 \\ \text{displacements} & & \text{velocities} \end{array}$$

$\nu = \frac{1}{Re}$

- same spaces X and Λ!
- same bilinear form $b(\cdot,\cdot)$!
- same LBB!
- same THEORY and NUMERICS!