The OSEEN problem in variational formulation:

(23) Find \( u \in V \) and \( p \in Q \):
\[
\begin{align*}
    a(w; u, v) + b(v, p) &= \langle f, v \rangle \quad \forall v \in V, \\
    b(u, q) &= 0 \quad \forall q \in Q.
\end{align*}
\]

For given \( w \), set \( a(u, v) := a(w; u, v) \).
Then (23) exactly has the form (24), where the bilinear form \( a(\cdot, \cdot) \) is here non-symmetric.

The STOKES problem:
For small Reynolds numbers (viscous flow), the (non-symmetric) convection term can be neglected. Thus, we obtain the VF:

(24) Find \( u \in V \) and \( p \in Q \):
\[
\begin{align*}
    a(u, v) + b(v, p) &= \langle f, v \rangle \quad \forall v \in V, \\
    b(u, q) &= 0 \quad \forall q \in Q
\end{align*}
\]

with the symmetric bilinear form
\[
a(u, v) := \frac{1}{Re} \int_{\Omega} \nabla u \cdot \nabla v \, dx.
\]

In the Lect. "CM", the existence and uniqueness of the solution \( (u, p) \in V \times Q \) will be shown, i.e., the pressure \( p \) is unique only up to an additive constant, and the FE discretization will be discussed.

\[
\downarrow
\]

\( V_h \subset V, \; Q_h \subset Q \) \; \forall \; \text{mixed FEM}

\[
\downarrow
\]

discrete \text{LBB} \; \text{condition}!