# EQUAL-ORDER FINITE ELEMENT METHOD FOR THE STOKES EQUATIONS WITH VARIABLE VISCOSITY

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Abstract. In this talk, we discuss the outcomes of [3]. This work builds upon the work outlined in [1], which uses a Taylor–Hood scheme to study the Stokes equations with variable viscosity. Our approach employs a stabilized finite element scheme based on the Galerkin Least Squares method, utilizing equal-order polynomials to approximate both velocity and pressure. The challenge in this study stems from the significant variation in viscosity spanning several orders of magnitude, that appears in some applications as models for the simulation of mantle convection (see, for example, [2]). We address this challenge by establishing optimal *a priori* error estimates for our novel stabilized scheme, which we subsequently validated through numerical tests.

**Keywords**: Non-newtonian flow, incompressible Stokes equations, variable viscosity, stabilized finite element method, dependency on the viscosity.

**Mathematics Subject Classifications (2010)**: 65L60.

## References

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