

# Multilevel matrix-free solver for Stokes problem with strongly variable viscosity<sup>\*</sup>

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We present a matrix-free preconditioner for linear systems arising from finite element discretization of Stokes equations in 2D or 3D, with discontinuous viscosity. The method consists of a multigrid with block smoother based on [1], accompanied with Chebyshev smoothers inside blocks. The preconditioner has been implemented in `deal.II` library, utilizing its matrix-free framework. Numerical experiments indicate that the convergence rate of the GMRES iteration preconditioned with this method is independent of the mesh size and very weakly dependent on the magnitude of jumps in the viscosity coefficient.

## References

1. Zulehner W.: A class of smoothers for saddle point problems. *Computing*, 65(3):227-246 (2000).

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