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Monolithic Multigrid for the Stokes Equations

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Recent years have seen renewed interest in the numerical solution of the Stokes Equations. Much of the resulting work has focused on block-factorization approaches using algebraic multigrid as a solver for the vector Poisson block. Monolithic methods, in contrast, offer the possibility of better overall efficiency by avoiding costly inner–outer iteration strategies and inaccurate approximations of the true Schur complement. In this talk, we present preliminary numerical experiments using overlapping Vanka smoothers within geometric multigrid, implemented in the MueMat framework from Sandia Labs. We explore both the classic Taylor–Hood discretization and a new BDM–based discretization that ensures local conservation of mass.