

## Skaičiavimo metodų ir matematinio modeliavimo seminaras Nr. 24 (194)

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Analysis of new smoothers for MG algorithms for the generalized Stokes equations

We focus on the efficient multigrid solution of the Stokes equations from incompressible fluid dynamics. The state-of-the-art smoother for the Stokes equations includes a Gauss-Seidel-type coupled Vanka smoother, in which the primary unknowns, pressure and the velocities in a grid cell are updated simultaneously, in such a way, that locally the constraint of divergence-free solutions is maintained. Decoupled, i.e., equation-wise, smoothing is often preferred for reasons of efficiency. Here, we explain one such smoother, a segregated Gauss-Seidel smoother of Uzawa-type, for different discretizations of Stokes equations. In particular finite difference discretizations on staggered and also on collocated grids are considered, as well as a stabilized linear finite element scheme.

We explain its implementation and analyze it by means of local Fourier Analysis. In particular, we obtain an analytic bound on the smoothing factor showing uniform performance for a family of Stokes problems, ranging from stationary to time dependent with small time step.

[Kviečiame dalyvauti.](#)  
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