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“Commutator-Based Schur Complement Preconditioners for Saddle-Point Problems”

The simulation of fluid-flow problems using the Stokes or Navier-Stokes equation requires the numerical solution of saddle point problems. The main difficulty here lies in solution methods for the dense Schur complement. In this talk, we will discuss algebraic commutator-based preconditioners introduced by Elman et al. (2006). These preconditioners are based on solving a least-squares problem to obtain a commutator that can be used for the approximation of the Schur complement. We will consider a modified version of the BFBt method and a technique that is based on an algorithm for sparse approximate inverses. The preconditioners will be applied to fluid dynamic applications implemented in the Deal II finite element software library.