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AN IMPLICIT APPROXIMATE INVERSE PRECONDITIONER FOR SADDLE POINT PROBLEMS*

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Abstract. We present a preconditioner for saddle point problems which is based on an approximation of an implicit representation of the inverse of the saddle point matrix. Whereas this preconditioner does not require an approximation to the Schur complement, its theoretical analysis yields some interesting relationship to some Schur-complement-based preconditioners. Whereas the evaluation of this new preconditioner is slightly more expensive than the evaluation of standard block preconditioners from the literature, it has the advantage that, similar to constraint preconditioners, the iterates of the preconditioned system satisfy the constraint equations exactly. We will demonstrate the performance of the implicit approximate inverse preconditioner in the iterative solution of the discrete two- as well as three-dimensional Oseen equations.

Key words. saddle point problem, preconditioning

AMS subject classifications. 65F05, 65F30, 65F50, 65N22, 65N30

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