Constraint Preconditioners For Nonsymmetric Saddle Point Problems

Yimin Wei
School of Mathematical Sciences, Fudan University, Shanghai 200433, China
ymwei@fudan.edu.cn
Yiqin Lin
Department of Mathematics and Computational Science, Hunan University of Science and Engineering, Yongzhou 425100, China

A class of constraint preconditioners [1] for solving nonsymmetric saddle point problems in [2](two-by-two block linear equations) with the (1,2)-block being the transpose of the (2,1)-block and the (2,2)-block being zero was investigated in a recent paper of Cao in [3]. In this talk, we extend his idea by allowing the (1,2)-block to be not equal to the transpose of the (2,1)-block. Results concerning the spectrum, the form of the eigenvectors and the convergence behaviour of a Krylov subspace method, such as GMRES are presented.

References

[1] C. Keller, N. Gould and A. Wathen, Constraint preconditioning for indefinite linear systems, *SIAM Journal on Matrix Analysis and Applications*, 21:1300–1317, 2000.
[2] C. Siefert and E. de Sturler, Preconditioners for generalized saddle-point problems, *SIAM Journal on Numerical Analysis*, 44:1275–1296, 2006.
[3] Z. Cao, A class of constraint preconditioners for nonsymmetric saddle point matrices, *Numerische Mathematik*, 103:47–61, 2006.