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ON A NON-STAGNATION CONDITION FOR GMRES AND APPLICATION TO SADDLE POINT MATRICES*

VALERIA SIMONCINI†

Abstract. In Simoncini and Szyld [Numer. Math., 109 (2008), pp. 477–487] a new non-stagnation condition for the convergence of GMRES on indefinite problems was proposed. In this paper we derive an enhanced strategy leading to a more general non-stagnation condition. Moreover, we show that the analysis also provides a good setting to derive asymptotic convergence rate estimates for indefinite problems. The analysis is then explored in the context of saddle point matrices, when these are preconditioned in a way so as to lead to nonsymmetric and indefinite systems. Our results indicate that these matrices may represent an insightful training set towards the understanding of the interaction between indefiniteness and stagnation.

Key words. saddle point matrices, large linear systems, GMRES, stagnation.

AMS subject classifications. 65F10, 65N22, 65F50.

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†Dipartimento di Matematica, Università di Bologna, Piazza di Porta S. Donato 5, I-40127 Bologna, Italy and CIRSA, Ravenna, Italy (`valeria@dm.unibo.it`).