

THE COMPLETE STAGNATION OF GMRES FOR $N \leq 4$ *

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Abstract. We study the problem of complete stagnation of the generalized minimum residual method for real matrices of order $n \leq 4$ when solving nonsymmetric linear systems $Ax = b$. We give necessary and sufficient conditions for the non-existence of a real right-hand side b such that the iterates are $x^k = 0$, $k = 0, \dots, n - 1$, and $x^n = x$. We illustrate these conditions with numerical experiments. We also give a sufficient condition for the non-existence of complete stagnation for a matrix A of any order n .

Key words. GMRES, stagnation, linear systems

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