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Variants of IDR with partial orthonormalization. (English) Zbl 1368.65066

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Summary: We present four variants of IDR(s) that generate vectors such that consecutive blocks of $s+1$ vectors are orthonormal. IDR methods are based on tuning parameters: an initially chosen, so-called *shadow space*, and the so-called *seed values*. We collect possible choices for the seed values. We prove that under certain conditions all four variants are mathematically equivalent and discuss possible breakdowns. We give an error analysis of all four variants and a numerical comparison in the context of the solution of linear systems and eigenvalue problems.

MSC:

65F25 Orthogonalization in numerical linear algebra
65F10 Iterative numerical methods for linear systems
65F15 Numerical computation of eigenvalues and eigenvectors of matrices
65F50 Computational methods for sparse matrices

Keywords:

IDR; partial orthonormalization; minimum norm expansion; error analysis

Software:

Algorithm 913; BiCGstab; mctoolbox

Full Text: EMIS