

## EFFICIENT EXPANSION OF SUBSPACES IN THE JACOBI-DAVIDSON METHOD FOR STANDARD AND GENERALIZED EIGENPROBLEMS\*

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**Abstract.** We discuss approaches for an efficient handling of the correction equation in the Jacobi-Davidson method. The correction equation is effective in a subspace orthogonal to the current eigenvector approximation. The operator in the correction equation is a dense matrix, but it is composed from three factors that allow for a sparse representation. If the given matrix eigenproblem is sparse then one often aims for the construction of a preconditioner for that matrix. We discuss how to restrict this preconditioner effectively to the subspace orthogonal to the current eigenvector. The correction equation itself is formulated in terms of approximations for an eigenpair. In order to avoid misconvergence one has to make the right selection for the approximations, and this aspect will be discussed as well.

**Key words.** linear eigenproblems, generalized eigenproblems, Jacobi-Davidson, harmonic Ritz values, preconditioning.

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