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An indefinite variant of LOBPCG for definite matrix pencils

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Abstract. In this paper, we propose a novel preconditioned solver for generalized Hermitian eigenvalue problems. More specifically, we address the case of a definite matrix pencil $A - \lambda B$, that is, $A$, $B$ are Hermitian and there is a shift $\lambda_0$ such that $A - \lambda_0 B$ is definite. Our new method can be seen as a variant of the popular LOBPCG method operating in an indefinite inner product. It also turns out to be a generalization of the recently proposed LOBP4DCG method by Bai and Li for solving product eigenvalue problems. Several numerical experiments demonstrate the effectiveness of our method for addressing certain product and quadratic eigenvalue problems.