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SOLVING LARGE-SCALE QUADRATIC EIGENVALUE PROBLEMS WITH HAMILTONIAN EIGENSTRUCTURE USING A STRUCTURE-PRESERVING KRYLOV SUBSPACE METHOD*

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Abstract. We consider the numerical solution of quadratic eigenproblems with spectra that exhibit Hamiltonian symmetry. We propose to solve such problems by applying a Krylov-Schur-type method based on the symplectic Lanczos process to a structured linearization of the quadratic matrix polynomial. In order to compute interior eigenvalues, we discuss several shift-and-invert operators with Hamiltonian structure. Our approach is tested for several examples from structural analysis and gyroscopic systems.

Key words. quadratic eigenvalue problem, Hamiltonian symmetry, Krylov subspace method, symplectic Lanczos process, gyroscopic systems

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