GENERALIZATIONS OF HARMONIC AND REFINED RAYLEIGH–RITZ[*]

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Abstract. We investigate several generalizations of the harmonic and refined Rayleigh–Ritz method. These may be practical when one is interested in eigenvalues close to one of two targets (for instance, when the eigenproblem has Hamiltonian structure such that eigenvalues come in pairs or quadruples), or in rightmost eigenvalues close to (for instance) the imaginary axis. Our goal is to develop new methods to extract promising approximate eigenpairs from a search space, for instance one generated by the Arnoldi or Jacobi–Davidson method. We give theoretical as well as numerical results of the methods, and recommendations for their use.

AMS subject classifications. 65F15, 65F50

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