

# HARMONIC RAYLEIGH-RITZ FOR THE MULTIPARAMETER EIGENVALUE PROBLEM

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## Abstract

Harmonic extraction methods for the multiparameter eigenvalue problem will be presented. These techniques are generalizations of their counterparts for the standard and generalized eigenvalue problem. The methods aim to approximate interior eigenpairs, generally more accurately than the standard extraction does. The process can be combined with any subspace expansion approach, for instance a Jacobi-Davidson type technique, to form a subspace method for multiparameter eigenproblems of high dimension.

We will focus on the two-parameter eigenvalue problem

$$\begin{aligned} A_1 x_1 &= B_1 x_1 + C_1 x_1, \\ A_2 x_2 &= B_2 x_2 + C_2 x_2, \end{aligned}$$

for given  $n_i \times n_i$  (real or complex) matrices  $A_i, B_i, C_i$  for  $i = 1, 2$ ; we are interested in eigenpairs  $((\lambda_1, \lambda_2), x_1 \otimes x_2)$  where  $x_1$  and  $x_2$  have unit norm.

## References

- [1] M. E. HOCHSTENBACH AND B. PLESTENJAK, *Harmonic Rayleigh-Ritz for the multiparameter eigenvalue problem*, CASA Report 06-35, TU Eindhoven, October 2006.