1 Recycling Ritz vectors in the parameterized Lanczos method

By Karl Meerbergen.

The solution of the parameterized system

$$Ax = f \quad \text{with} \quad A = K - \omega^2 M \tag{1}$$

with K real symmetric, and M symmetric positive definite arises in applications, including structural engineering and acoustics. The parameter ω is often the frequency and lies in the frequency interval where the numerical model is valid. The solution x is called the frequency response function.

The traditional method in engineering is modal superposition where (1) is projected on well selected eigenvectors associated with the eigenvalues of

$$Ku = \lambda Mu \ . \tag{2}$$

This method is usually experienced as very efficient when the eigenvectors and eigenvalues are available, since (1) is transformed to a diagonal linear system, but it requires the computation of a significant amount of eigenvectors.

Efficient methods for solving (1) have been developed over the last decade, in the context of iterative linear system solvers for parameterized problems [5] [4], and the Padé via Lanczos method in the context of modelreduction [3] [1] [2].

In this talk, we discuss the use of Ritz vectors to preconditioning the Lanczos method for solving the parameterized system (1). We apply the method for solving (1) with many right-hand sides simultaneously.

References

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