

## Rational Krylov subspaces for Hermitian matrices: properties and applications

*Friday, 10 June 2022 16:00 (30 minutes)*

Rational Krylov subspaces have become a fundamental ingredient in numerical linear algebra methods associated with reduction strategies. Nonetheless, a lot of their potential is still to be explored.

In particular, many structural properties of the reduced matrices in these subspaces are not fully understood. We advance in this analysis by deriving decay bounds on the entries of rational Krylov reduced matrices and of their functions, which hold in spite of the lack of any banded structure in the considered matrices.

Moreover, when data matrices are Hermitian, a short-term recurrence can be used to generate an associated orthonormal basis. We propose an implementation that allows one to obtain the rational subspace reduced matrices at lower overall computational costs than proposed in the literature. Applications are discussed where the short-term recurrence feature can be exploited to avoid storing the whole orthonormal basis.

This presentation is based on joint works with Davide Palitta, Università di Bologna, and Stefano Pozza, Charles University, Prague.

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