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Extrapolation in nonstationary iterations for matrix equations

Friday, September 5, 2025 11:00 AM (30 minutes)

Reduced rank extrapolation (RRE) [1,2] can be used to accelerate convergent vector sequences. These sequences are often generated by an iterative process to solve algebraic equations.
In this presentation, I discuss the generalization of this extrapolation framework to sequences of low-rank matrices which are generated by iterative methods for large-scale matrix equations, such as, e.g., low-rank alternating directions implicit methods for Lyapunov and Riccati equations [3]. Special emphasis will also be given to inserting these RRE approaches into nonstationary iterations [4] for general linear matrix equation.

References

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2. A. Sidi: Efficient implementation of minimal polynomial and reduced rank extrapolation methods. J. Comput. Appl. Math., 1991.
3. P. d. Boef, P. Kürschner, X. Liu, J. Maubach, J. Saak, W. Schilders, J. Schulze, N. v. d. Wouw: Generalizing Reduced Rank Extrapolation to Low-Rank Matrix Sequences, Arxiv preprint 2502.09165, 2025.
4. S. D. Shank, V. Simoncini and D. B. Szyld: Efficient low-rank solutions of Generalized Lyapunov equations, Numerische Mathematik, 2016

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