Contribution ID: **43** Type: **Talk**

Generalizing Reduced Rank Extrapolation to Low-Rank Matrix Sequences

Monday 17 February 2025 11:30 (30 minutes)

Reduced rank extrapolation (RRE) is an acceleration method typically used to accelerate the iterative solution of nonlinear systems of equations using a fixed-point process. In this context, the iterates are vectors generated from a fixed-point mapping function. However, when considering the iterative solution of large-scale matrix equations, the iterates are low-rank matrices generated from a fixed-point process for which, generally, the mapping function changes in each iteration. To enable acceleration of the iterative solution for these problems, we propose two novel generalizations of RRE. First, we show how to effectively compute RRE for sequences of low-rank matrices. Second, we derive a formulation of RRE that is suitable for fixed-point processes for which the mapping function changes each iteration. We demonstrate the potential of the methods on several numerical examples involving the iterative solution of large-scale Lyapunov and Riccati matrix equations.

Primary authors: DEN BOEF, Pascal (TU Eindhoven); KÜRSCHNER, Patrick (HTWK Leipzig); LIU, Xiaobo (Max Planck Institute for Dynamics of Complex Technical Systems); MAUBACH, Jos (TU Eindhoven); Dr SAAK, Jens (Max Planck Institute for Dynamics of Complex Technical Systems); SCHILDERS, Wil (TU Eindhoven); SCHULZE, Jonas (MPI DCTS); VAN DE WOUW, Nathan (TU Eindhoven)

Presenter: SCHULZE, Jonas (MPI DCTS)

Session Classification: Contibuted Talk