Minimal Residual Rational Krylov Subspace Method for Sequences of Shifted Linear Systems

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Abstract

The solution of sequences of shifted linear systems is a classic problem in numerical linear algebra and a variety of efficient methods has been proposed during the years. Nevertheless, challenging scenarios suffering the lack of performing solvers still exist. For instance, state-of-the-art procedures struggle to handle nonsymmetric problems where the shifts are complex numbers that do not come as conjugate pairs. In this talk, a novel projection strategy based on the rational Krylov subspace equipped with a minimal residual condition is presented. We also devise a novel pole selection procedure, tailored to our problem, providing poles for the rational Krylov basis construction that turn out to be more informative than those computed by available general-purpose schemes. A panel of diverse numerical results shows that our novel approach performs better than state-of-the-art techniques, especially on those very challenging problems mentioned above.

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