

A generalized global Arnoldi method based on tensor format for ill-posed tensor equations*

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Abstract

We study feasibility of using a method, obtained by developing the generalized global Arnoldi process in conjunction with Tikhonov regularization, based on tensor format (called GGAT_BTF method) to solve ill-posed tensor equations. More precisely, with the aid of the results given in [Numer. Linear Algebra Appl. 23 (2016) 444–466] and strategies used in [J Comput. Appl. Math. 236 (2012) 2078–2089], we construct an algorithm to solve Sylvester tensor equations with severely ill-conditioned and possibly full coefficient matrices. Some theoretical results are presented and applicability of the proposed is numerically examined for image restoration and solving a Sylvester tensor equation arising from exploiting the Chebyshev collocation spectral method to solve the 3D radiative transfer equation (RTE).

Keywords: Generalized Arnoldi process, Sylvester tensor equation, ill-conditioned, regularization

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