

Matrix functions in exponential integrators for problems with d -dimensional Kronecker structure

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Abstract

In this talk, we present an efficient, practical, and easy-to-implement way to approximate actions of φ -functions for matrices A with a d -dimensional Kronecker sum structure, that is $A = A_d \oplus \dots \oplus A_1$, in the context of exponential integrators. The method is based on a directional splitting of the involved matrix functions, which lets us exploit the highly efficient level 3 BLAS for the actual computation of the required actions in a μ -mode fashion. The approach has been successfully tested on matrix Riccati differential equations and on 3D semidiscretized partial differential equations, with various exponential integrators, showing consistent speedups with respect to a technique to compute actions of φ -functions for matrices in Kronecker form.

References

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