# PRECONDITIONED LINEAR SYSTEMS OF TIME-DEPENDENT PDES. PROPERTIES AND PERFORMANCES

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## Abstract

In this talk, we will survey some properties of the preconditioners introduced in [1,2] for the solution of the linear systems arising in time-dependent PDEs. Moreover, we will give theoretical results on the convergence rate of the underlying preconditioned iterations using various Krylov subspace methods. More precisely, if $s$ is the size of the matrices related to the time-step discretization, we will see that, asymptotically, the number of iterations required for convergence is at most $O(\log s)$, under suitable conditions. Therefore, if the preconditioned Krylov accelerator requires $O(1)$ ($O(\log s)$) iterations to converge, the computational complexity will be $O(s \log s)$ ($O(s \log^2 s)$), e.g., for PDEs whose Jacobian matrices, after semidiscretization, have a few nonzero diagonals. Details can be found in [3] using CG for the normal equations and in a forthcoming paper using GMRES.

Numerical experiments will confirm the theoretical analysis.

## References

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