

# BLOCK FACTORIZATION BASED PRECONDITIONERS WITH APPLICATIONS

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## **Abstract**

Approximate block factorization is a basis for construction of many preconditioners. Hierarchical decomposition of standard FEM matrices, saddle point matrices from mixed formulation, multiphysics problems like poroelasticity and PDE-constrained optimization are examples of problems with natural block structures allowing such factorization with approximations to the blocks and the Schur complements. The subsystems can be solved by inner iterations whereas the whole systems are solved iteratively by flexible variants of Krylov space solvers. We will show the general framework and efficiency of various preconditioners of this type for solving the above mentioned problems.