

Sparse factorizations: Towards optimal complexity and resilience at exascale
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Efficient solution of large-scale indefinite algebraic equations often relies on high quality preconditioners together with iterative solvers. Because of their robustness, factorization-based algorithms play a significant role in developing scalable solvers. We discuss the recent advances in high-performance sparse factorization techniques which are used to build sparse direct solvers, domain-decomposition type direct/iterative hybrid solvers, and approximate factorization preconditioners. In addition to algorithmic principles, we also address the key parallelism issues and practical aspects in order to fully utilize the highly heterogeneous architectures of the current and future HPC systems.