

TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall

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Preconditioners Based on Strong Subgraphs

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Abstract.

We propose an approach for obtaining block diagonal and block triangular preconditioners that can be used for solving a linear system $Ax = b$, where A is a large, nonsingular, real, $n \times n$ sparse matrix. The proposed approach uses Tarjan's 1982 algorithm for hierarchically decomposing a digraph into its strong subgraphs. To the best of our knowledge, this is the first work that uses this algorithm of Tarjan for preconditioning purposes. We describe the method, analyse its performance, and compare it with preconditioners from the literature such as ILUT and XPABLO and show that it is often better than XPABLO and competitive with ILUT for many matrices with the advantage that a version of our preconditioner is fully parallelizable.

This is joint work with Kamer Kaya (CERFACS, now in Ohio)