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Graph partitioning with matrix coefficients for symmetric positive definite linear systems

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Prior to the parallel solution of a large linear system, it is required to perform a partitioning of its equations/unknowns. Standard partitioning algorithms are designed using the considerations of the efficiency of the parallel matrix-vector multiplication, and typically disregard the information on the coefficients of the matrix. This information, however, may have a significant impact on the quality of the preconditioning procedure used within the chosen iterative scheme. In this talk, we describe a partitioning algorithm, which takes into account the information on the matrix coefficients and constructs partitions with respect to the objective of increasing the quality of the additive Schwarz preconditioning for symmetric positive definite linear systems. We demonstrate the effects of the new partitioning strategy on the robustness of an iterative scheme for a set of test problems.