

# Preconditioning Matrices by Diagonal Compensation with Rank One Matrices

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By a sequence of sparse symmetric positive semi-definite rank-one matrices we transform an original sparse s.p.d. matrix into a s.p.d. matrix with controllable sparsity (e.g., (block)-diagonal) minus another one which is a sum of local positive semi-definite matrices. The resulting decomposition naturally provides convergent smoothers as well as tools to build accurate interpolation matrices for use in AMG (algebraic multigrid). The method is supported with a set of numerical results on both PDE discretization matrices as well as some non-PDE ones.

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