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ADMM for Matrix Equations Arising in Inverse Problems

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In this talk we consider linear inverse problems where the matrix that models the forward problem can be decomposed into a sum of Kronecker products. We first show that such a decomposition can be computed very efficiently for large-scale problems in certain imaging applications. We then show how to exploit this decomposition to obtain an efficient implementation of the alternating direction method of multipliers (ADMM) to solve the inverse problem with total variation regularization. In particular, ADMM is an iterative solver that requires solving several subproblems at each iteration, and we describe how this can be done efficiently when the problem is reformulated as a generalized matrix equation.