

This paper develops a convex approach for sparse one-dimensional deconvolution that improves upon L1-norm regularization, the standard convex approach. We propose a sparsity-inducing non-separable non-convex bivariate penalty function for this purpose. It is designed to enable the convex formulation of ill-conditioned linear inverse problems with quadratic data fidelity terms. The new penalty overcomes limitations of separable regularization. We show how the penalty parameters should be set to ensure that the objective function is convex, and provide an explicit condition to verify the optimality of a prospective solution. We present an algorithm (an instance of forward-backward splitting) for sparse deconvolution using the new penalty.