Risk Hull Methods for Inverse Problems

Prof. Dr. Laurent Cavalier
(Université Aix-Marseille 1)

April 22, 2009

We study a standard method of regularization by projections of the linear inverse problem $Y = Af + \epsilon$, where ϵ is a white Gaussian noise, and A is a known compact operator with singular values converging to zero with polynomial decay. The unknown function f is recovered by a projection method using the SVD of A. The bandwidth choice of this projection regularization is governed by a data-driven procedure which is based on the principle of the risk hull minimization. We provide non–asymptotic upper bounds for the mean square risk of this method and we show, in particular, that in numerical simulations, this approach may substantially improve the classical method of unbiased risk estimation.