Analysis and Development of Algorithms for Regularization Parameters in the Solution of Linear Parameter Estimation Problems

Jodi Mead* and Rosemary A. Renaut†

April 2, 2007

Abstract

Solution of the regularized least squares problem for linear parameter estimation requires the use of regularization parameters. Typical approaches for finding an appropriate parameter choice involve methods such as the L-curve and cross-correlation methods. Recently, a new technique was introduced by Mead (2007) in which the weights on the parameter misfits are found by solving an optimization problem, for which it can be shown that the penalty functional follows a χ^2 distribution with n degrees of freedom, where n is the dimension of the data space. Here, our focus is on the impact of the formulation of this optimization problem for determing best possible confidence intervals on the parameter estimates, given the covariance structure on the data. The given optimization problem is reformulated to become more feasible. Experiments to show the validity of the new model, and theoretical results will be presented.

*Department of Mathematics, Boise State University, jmead@boisestate.edu
†Department of Mathematics and Statistics, Arizona State University, renaut@asu.edu