A Generalized Autocovariance Least-Squares Method for Kalman Filter Tuning

This paper discusses a method for estimating noise covariances from process data. In linear stochastic state-space representations the true noise covariances are generally unknown in practical applications. Using estimated covariances a Kalman filter can be tuned in order to increase the accuracy of the state estimates. There is a linear relationship between covariances and autocovariance. Therefore, the covariance estimation problem can be stated as a least-squares problem, which can be solved as a symmetric semidefinite least-squares problem. This problem is convex and can be solved efficiently by interior-point methods. A numerical algorithm for solving the symmetric is able to handle systems with mutually correlated process noise and measurement noise. (c) 2007 Elsevier Ltd. All rights reserved.