SESSION E.1

Detection and Estimation

PERFORMANCE BOUNDS IN ROBUST FILTERING AND SMOOTHING, P. Papantoni-Kazakos, Department of Electrical Engineering and Computer Science, The University of Connecticut, Stoors, Ct. 06268, (USA). Filtering and smoothing within a convex and closed family of stationary processes is considered. The performance criterion adopted is the mean square error. Using a saddle point game approach, we develop two classes of lower bounds for this error. Those bounds can be used as evaluated measures in the design of robust filters and smoothers, that include both linear and nonlinear operations for guaranteed qualitative robustness. (This research was supported by the Air Force Office of Scientific Research under the grant AFOSR-78-3695C.

ON THE INVERSE MINIMAX FILTERING PROBLEM, Sergio Verdue and H. Vincent Poor, Department of Electrical Engineering and the Coordinated Science Laboratory, University of Illinois at Urbana-Champaign, Urbana, IL. 61801, (USA). Given a set of admissible filters, H, an uncertain set of operating points, Q, and a performance functional M(•,•), the minimax filtering problem is to find a filter that maximizes the worst performance over the uncertainty set. In the inverse minimax filtering problem, we are given an element, H_0, belonging to H and the objective is to characterize the class of sets Q such that h_0 is a minimax filter for (H,Q,M). The solution to the inverse minimax filtering problem identifies the type and degree of uncertainties for which a given filter (possibly designed according to other criteria) is minimax robust and can provide valuable insight for solving the direct minimax problem. In this paper, we give a simple necessary and sufficient condition characterizing a set Q for which h_0 is a saddle-point minimax filter. This condition is particularized to the problem of matched filtering under signal and noise operator uncertainties yielding results with intuitive geometric interpretations. In connection with the inverse minimax filtering problem, several robustness indices are proposed in order to assess the minimax performance of a given filter with respect to a particular type of uncertainties. (This work was supported by the U.S. Office of Naval Research under Contract N0014-81-K-0014).

TWO DIMENSIONAL ARMA MODELS, R.L. Kashyap, School of Electrical Engineering, Purdue University, West Lafayette, IN 47907, (USA). A class of finite order two dimensional autoregressive moving average (ARMA) is introduced having the ability to represent any process with rational spectral density. In this model, the driving noise is correlated and need not be Gaussian. Currently known classes of ARMA models or AR models are shown to be subsets of the above class. We discuss the three definitions of markov property and precisely state