SYSTEM IDENTIFICATION AND PARAMETER ESTIMATION IN PRESENCE OF BOUNDED NOISE: A CONVEX RELAXATION BASED APPROACH

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Abstract: Estimation theory can roughly be defined as a branch of mathematics dealing with the problem of inferring the values of some unknown variables, usually called *parameters*, from a set of empirical data related to the unknown parameters through a given, possibly uncertain, mathematical relation. Experimental data are usually obtained by means of measurement procedures that are known to be affected by uncertainty. Most of the results available in the estimation theory literature are based on a statistical description of the uncertainty affecting the data.

A worthwhile alternative to the stochastic description, is the so-called bounded-error or set-membership characterization where measurement errors are assumed to be *unknown but bounded* (UBB), i.e., the measurement uncertainties are assumed to belong to a given bounded set. Such a description seems to be more suitable in those cases where either a priori statistical information is not available or the errors are better characterized in a deterministic way (e.g., systematic and class errors in measurement equipments, rounding and truncation errors in digital devices). Based on the UBB description of the uncertainty, a new paradigm called bounded-error or set-membership estimation has been proposed starting with the seminal work of F.C. Schweppe in the late sixties. In this talk a novel approach to Set-membership estimation based on the solution of suitable convex optimization/relaxation problems is discussed focusing, in particular, on its advantages with respect to the techniques previously proposed in the literature.