

DESIGN OF ROBUST RECURSIVE IDENTIFICATION ALGORITHMS FOR LARGE-SCALE STOCHASTIC SYSTEMS

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Abstract. *The robust recursive algorithms, for identification of decentralized stochastic systems, are developed. It is supposed that stochastic disturbance belongs to a specified class of distributions which include the gross error model suitable for the description of outliers presence. Such an assumption introduces into the recursive algorithms a nonlinear transformation of prediction error. The given algorithms are robust with respect to uncertainty in the disturbance distribution. The individual subsystems are described with SISO (single-input single output) ARMAX model. Two algorithms are considered: the stochastic approximation and the least squares. Their comparison is based on simulations.*

Key words: *large-scale systems, outliers, Huber's theory, robust estimation, stochastic approximation, least squares*

1. INTRODUCTION

High performance requirement of complex industrial processes increases demands on control systems. The concept of driving a large system by a central computer has become unsuitable for either economic or reliability reasons. A number of large-scale systems founded in the real world are composed of a set of small, interconnected subsystem, such as power systems with strong interactions, water systems which are widely distributed in space, traffic systems with many external signals, large-space flexible structures, digital communication networks and economic systems. It is generally impossible to incorporate many feedback loops into the controller design and is too costly even if they can be implemented. These difficulties motivate the development of decentralized control theory, in which each subsystem is controlled independently [1-5].

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