

# DECENTRALIZED STOCHASTIC MINIMUM VARIANCE CONTROLLER

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## Abstract:

In this paper, the problem of stochastic control for a class of large-scale systems is considered. As the local controllers are used a minimum variance controllers. The subsystems are described with multi-input/multi-output ARMAX models. The interconnections of subsystems are nonlinear functions. It is shown in the form of theorem that the overall mean-square tracking error is bounded.

## 1. Introduction

One of the central problems in modern system theory and practice is the complexity [2], [3]. Instead of high performance control systems based on central computer now are introduced concepts such as subsystems, interconnections, distributed computing and parallel processing. The fundamental characteristics of complexity are dimensionality, uncertainty, and information structure constraints [14]. As a fundamental methods for complex systems control in [12] are denoted decomposition and aggregation.

The centralized controller which uses all measurements to determine the value of all manipulations, makes the implementation of such a

control strategy impossible. Alternative for such situation are local controllers which are responsible for the operation of on adjacent unit. Such approach is known as decentralized control. It is well known that for a given plant and decentralized structure may not exists any decentralized stabilizing controller [1]. Robust decentralized controller is considered in [11]. The control of complex nonlinear systems is the main topic of monograf [6].

In the decentralizes control the nominal structure of the system consists of collection of decoupled subsystems and the structure uncertainty is owing the presence of coupling term. In the papers [5], [9] and [13] the decentralized adaptive controllers (deterministic and stochastic) are considered..

In the references [5] and [13] the decentralized stochastic adaptive control of interconnected subsystems is developed. It is supposed that the decoupled subsystems are described by single input/singl-output ARMAX model. As a recursive algorithm is used stochastic approximation. The global stability of closed-loop system and the overall mean-square tracking error is established.

In this paper will be considered decentralized stochastic non-adaptive control of large scale systems. The subsystems are described with multi-input/multi-output ARMAX models. The interconnections between subsystems are realized by corresponding vector outputs. The local controllers are minimum variance controllers and, as well known, the controller is given by











