

Adaptive Input Design for Identification of Output Error Model with Constrained Output

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Received: 20 January 2013 / Revised: 21 June 2013
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Abstract Optimal input design for system identification is an area of intensive modern research. This paper considers the identification of output error (OE) model, for the case of constrained output variance. The constraint plays a very important role in the process industry, in the reduction of degradation of product quality. In this paper, it is shown, in the form of a theorem, that the optimal input signal, with constrained output, is achieved by a minimum variance controller together with a stochastic reference. The key problem is that the optimal input depends on the system parameters to be identified. In order to overcome this problem, a two-stage adaptive procedure is proposed: obtaining an initial model using PRBS as input signal; application of adaptive minimum variance controller together with the stochastic variable reference, in order to generate input signals for system identification. Theoretical results are illustrated by simulations.

Keywords System identification · Optimal input design · Output error model · Constrained output · Two-stage adaptive procedure

1 Introduction

The design of controllers is largely based on the use of mathematical models that are obtained during the process of system identification [5, 14, 17, 22]. The area, which deals with obtaining the mathematical model of the process, remains vibrant, as shown by recent research [4, 10, 11, 13, 15, 23].

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