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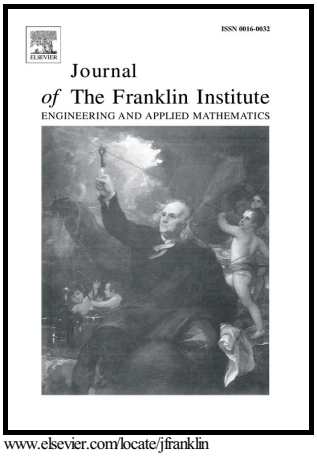

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Sliding mode control design for linear systems subject to quantization parameter mismatch

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Abstract

This paper is concerned with the sliding mode control design for linear systems considering the mismatch between quantization sensitivity parameters generated at the coder and decoder sides. By analyzing the working principle of the encoder/decoder, and the feature of the digital communication channel, a mismatched relation between the quantization parameters is formed by using a time varying ratio model which includes the existing results as special cases. Sequently, based on the established mathematical model, sliding mode control laws are designed to ensure the asymptotical stability of the whole dynamical system. Finally, examples are shown to verify the validity of the theoretical results.

Keywords: Sliding mode control, signal quantization, mismatch, stabilization.

1 Introduction

Sliding mode control evolved from the pioneering work in Russia in the early 1960s and it has been well investigated as a so-called robust control technique to control dynamical systems with time varying parameter perturbations, modeling uncertainties, and external disturbances [1], [2]. Up to date, sliding mode control has been successfully applied to various automatic control fields, such as electric motor control, robotics, and automatic flight control.

On the other hand, since a large number of information processing units are applied in modern engineering control systems, signal quantization problem has become an interesting and active research topic and much attention has been paid from the engineering control field. Numerous well-known results regarding to quantized control have been issued in [3-14]. Among these research work, quantized feedback control design via sliding mode control technique is an important aspect. For example, for single-input linear uncertain systems in

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