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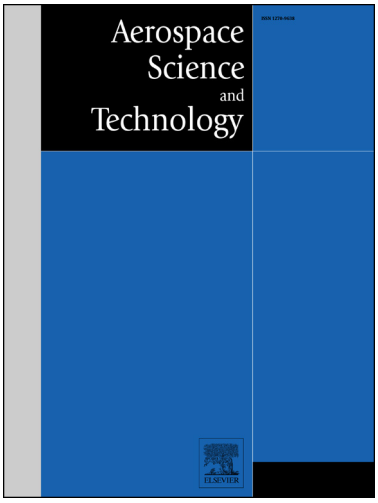

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Fei Sun, Kamran Turkoglu

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Distributed Real-Time Non-Linear Receding Horizon Control Methodology for Multi-Agent Consensus Problems

Fei Sun[a,*], Kamran Turkoglu[a]

[a] *Aerospace Engineering, San José State University, San Jose, CA 95192*

Abstract

This work investigates the consensus problem for multi-agent nonlinear systems through the real-time nonlinear receding horizon control methodology. A scheme is developed to reach the consensus for nonlinear multi-agent systems under fixed directed/undirected graph(s) without any linearization technique. The problem of consensus is converted into an optimization problem and is directly solved by the backwards sweep Riccati method to generate the control protocol which is a non-iterative algorithm. Stability analysis is conducted to provide convergence guarantees. An extension to the leader-following consensus problem of nonlinear systems is presented. Several examples are provided to validate the effectiveness of the presented scheme.

Keywords: multi-agent consensus problems, leader-following consensus problems, nonlinear receding horizon control, real-time optimization, chaotic systems

1. Introduction

With their sophisticated structure, multi-agent related consensus problems have attracted significant interest in recent years. The complex nature and sophisticated framework of multi-agent consensus problem serves as a fertile ground for the application of advanced control algorithms, and found basis in

*Email: fei.sun@sjsu.edu; Fax: +1-408-924-3818