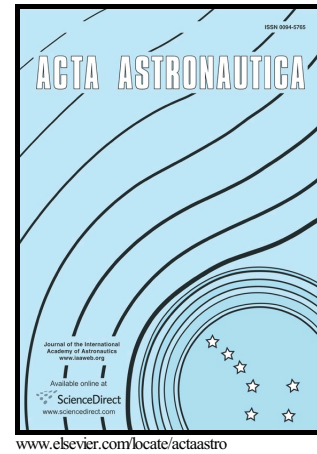


Finite time coordinated formation control for spacecraft formation flying under directed communication topology

Dechao Ran, Xiaoqian Chen, Arun K. Misra



PII: S0094-5765(16)30592-6
DOI: <http://dx.doi.org/10.1016/j.actaastro.2017.01.010>
Reference: AA6161

To appear in: *Acta Astronautica*

Received date: 23 June 2016
Revised date: 15 November 2016
Accepted date: 6 January 2017

Cite this article as: Dechao Ran, Xiaoqian Chen and Arun K. Misra, Finite time coordinated formation control for spacecraft formation flying under directed communication topology, *Acta Astronautica*
<http://dx.doi.org/10.1016/j.actaastro.2017.01.010>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Finite time coordinated formation control for spacecraft formation flying under directed communication topology

Dechao Ran^{a,b}, Xiaoqian Chen^{a*}, Arun K. Misra^b

^aCollege of Aerospace Science and Engineering, National University of Defense Technology, Changsha, China 410073

^bDepartment of Mechanical Engineering, McGill University, QC, Canada H3A 2K6

dechao.ran@mail.mcgill.ca

chenxiaoqian@nudt.edu.cn

arun.misra@mcgill.ca

1 Abstract

This paper investigates the finite time coordinated formation control problem for spacecraft formation flying (SFF) under the assumption of directed communication topology. By using the neighborhood state measurements, a robust finite time coordinated formation controller is firstly designed based on the nonsingular terminal sliding mode surface. To address the special case that the desired trajectory of the formation is only accessible to a subset of spacecraft in the formation, an adaptive finite time coordinated formation controller is also proposed by designing a novel sliding mode surface. In both cases, the external disturbances are explicitly taken into account. Rigorous theoretical analysis proves that the proposed control schemes ensure that the closed-loop system can track the desired time-varying trajectory in finite time. Numerical simulations are presented that not only highlights the closed-loop performance benefits from the proposed control algorithms, but also illustrates the effectiveness in the presence of external disturbances when compared with the existing coordinated formation control schemes.

Download English Version:

<https://daneshyari.com/en/article/5472377>

Download Persian Version:

<https://daneshyari.com/article/5472377>

[Daneshyari.com](https://daneshyari.com)