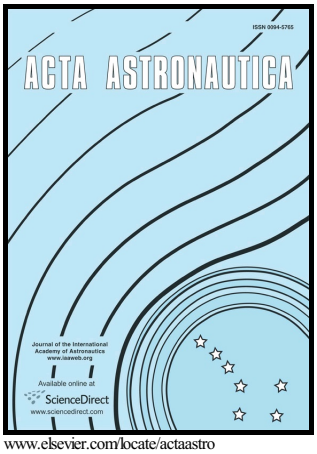
Author's Accepted Manuscript

A Small-Gain Method for Integrated Guidance and Control in Terminal Phase of Reentry

Han Yan, Shuping Tan, Yingzi He



www.elsevier.com/locate/actaastro

PII: S0094-5765(16)30681-6
DOI: http://dx.doi.org/10.1016/j.actaastro.2016.12.027
Reference: AA6138

To appear in: *Acta Astronautica*

Received date: 20 July 2016
Accepted date: 21 December 2016

Cite this article as: Han Yan, Shuping Tan and Yingzi He, A Small-Gain Method for Integrated Guidance and Control in Terminal Phase of Reentry, *Acta Astronautica,* http://dx.doi.org/10.1016/j.actaastro.2016.12.027

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.

ACCEPTED MANUSCRIPT

A Small-Gain Method for Integrated Guidance and Control in Terminal Phase of Reentry*

Han Yan†, Shuping Tan‡, Yingzi He§

Science and Technology on Space Intelligent Control Laboratory,
Beijing Institute of Control Engineering, Beijing 100190, China

Abstract: The guidance and control systems of reentry vehicles are usually designed separately and then integrated, but the scheme can be argued that synergistic relationships between the two subsystems are not fully exploited. In order to improve the performance of reusable launch vehicles (RLVs), this paper proposes an integrated guidance and control law for approach and landing of a RLV. According to the idea of reference-trajectory guidance, the angle of attack and bank angle commands are designed using sliding mode control (SMC) method to make the reference-trajectory tacking error converge into a small neighborhood of zero. An integrated guidance and control (IGC) law is developed utilizing generalized small-gain theorem to enforce the commands, and theoretical analysis shows that the law can guarantee the stability of the overall system. The Monte Carlo simulation confirms the effectiveness of the proposed design approach.

Key words: Reusable launch vehicles; Approach and landing phase; Reference trajectory; Integrated guidance and control; Small-gain theorem; Robustness.

Accepted manuscript

*This work was supported by the National Natural Science Foundation of China under Grant 61403030.

†Engineer, email: yhbice@gmail.com

‡Senior engineer.

§Professor.

Download English Version:

https://daneshyari.com/en/article/5472575

Download Persian Version:

https://daneshyari.com/article/5472575

Daneshyari.com