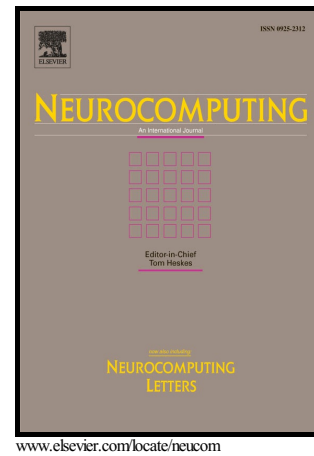


Adaptive RBFNNs/integral sliding mode control  
for a quadrotor aircraft

Shushuai Li, Yaonan Wang, Jianhao Tan, Yan  
Zheng



PII: S0925-2312(16)30778-0  
DOI: <http://dx.doi.org/10.1016/j.neucom.2016.07.033>  
Reference: NEUCOM17390

To appear in: *Neurocomputing*

Received date: 11 October 2015  
Revised date: 20 May 2016  
Accepted date: 17 July 2016

Cite this article as: Shushuai Li, Yaonan Wang, Jianhao Tan and Yan Zheng, Adaptive RBFNNs/integral sliding mode control for a quadrotor aircraft *Neurocomputing*, <http://dx.doi.org/10.1016/j.neucom.2016.07.033>

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.

# Adaptive RBFNNs/integral sliding mode control for a quadrotor aircraft

Shushuai Li\*, Yaonan Wang, Jianhao Tan, Yan Zheng

*College of Electrical and Information Engineering, Hunan University, Changsha Hunan, 410082, China*

---

## Abstract

This paper presents a novel hierarchical control strategy based on adaptive radical basis function neural networks (RBFNNs) and double-loop integral sliding mode control (IntSMC) for the position and attitude tracing of quadrotor unmanned aerial vehicles (UAVs) subjected to sustained disturbances and parameter uncertainties. The dynamical motion equations are obtained by the Lagrange-Euler formalism. The proposed controller combines the advantage of the IntSMC with the approximation ability of arbitrary functions ensured by RBFNNs to generate a control law to guarantee the faster convergence of the state variables to their desired values in short time and compensation for the disturbances and uncertainties. Capabilities of online adaptive estimating of the unknown uncertainties and null tracking error are proved by using the Lyapunov stability theory. Simulation results, also compared with traditional PD/IntSMC algorithms and with the backstepping/nonlinear  $H_\infty$  controller, verify the effectiveness and robustness of the proposed control laws.

*Keywords:* Quadrotor aircrafts, adaptive RBFNNs control, double-loop integral sliding mode control, hierarchical control

---



---

\*Corresponding author.

*Email address:* shsli@hnu.edu.cn (Shushuai Li)

Download English Version:

<https://daneshyari.com/en/article/4948328>

Download Persian Version:

<https://daneshyari.com/article/4948328>

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