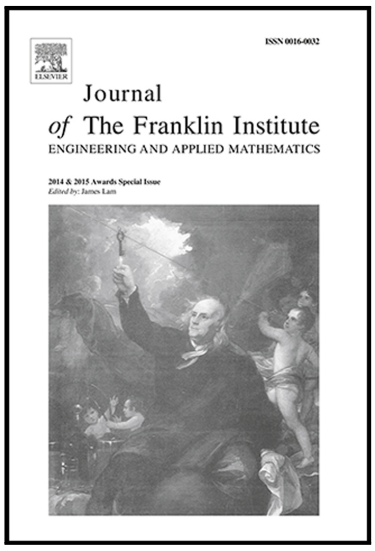

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Adaptive prescribed performance control of QUAVs with unknown time-varying payload and wind gust disturbance

Changchun Hua[a,*], Jiannan Chen[a], Xinping Guan[b]

[a] *Institute of Electrical Engineering, Yanshan University, Qinhuangdao, 066004, China*
[b] *School of Electronics, Information and Electric Engineering, Shanghai Jiaotong University, Dongchuan Road 800, Shanghai, 200240, China*

Abstract

In this paper, a new robust adaptive prescribed performance control (PPC, for short) scheme is proposed for quadrotor UAVs (QUAVs, for short) with unknown time-varying payloads and wind gust disturbances. Under the presented framework, the overall control system is decoupled into translational subsystem and rotational subsystem. These two subsystems are connected to each other through common attitude extraction algorithms. For translational subsystem, a novel robust adaptive PPC strategy is designed based on the sliding mode control technique to provide better trajectory tracking performance and well robustness. For rotational subsystem, a new robust adaptive controller is constructed based on backstepping technique to track the desired attitudes. Finally, the overall system is proved to be stable in the sense of uniform ultimate boundedness, and numerical simulation results are presented to validate the effectiveness of the proposed control scheme.

Keywords: Adaptive robust control, Unknown time-varying payloads, Prescribed performance control, Wind gust disturbances.

*Corresponding author
Email address: cch@ysu.edu.cn (Changchun Hua)