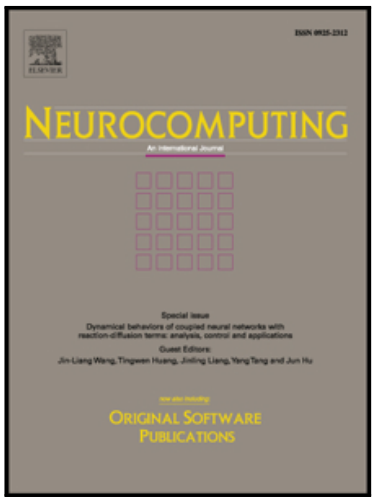

Simultaneous Learning and Control of Parallel Stewart Platforms with Unknown Parameters

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PII: S0925-2312(17)30863-9
DOI: 10.1016/j.neucom.2017.05.026
Reference: NEUCOM 18444

To appear in: *Neurocomputing*

Received date: 17 January 2017
Revised date: 28 March 2017
Accepted date: 11 May 2017

Please cite this article as: Mohammed Aquil Mirza, Shuai Li, Long Jin, Simultaneous Learning and Control of Parallel Stewart Platforms with Unknown Parameters, *Neurocomputing* (2017), doi: 10.1016/j.neucom.2017.05.026

Simultaneous Learning and Control of Parallel Stewart Platforms with Unknown Parameters[☆]

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Abstract

Redundancy resolution of parallel manipulators is widely studied and have brought many challenges in the control of robotic manipulators. The dual neural network, which is categorized under the recurrent neural network inherits parallel processing capabilities, are widely investigated for the control of serial manipulators in past decades and has been extended to the control of parallel Stewart platforms in our previous work. However, conventional dual neural network solutions for redundancy resolution requires prior knowledge of the robot, which may not accessible accurately in real applications. In this paper, we establish a model-free dual neural network to control the end-effector of a Stewart platform for the tracking of a desired spacial trajectory, at the same time as learning the unknown time-varying parameters. The proposed model is purely data driven. It does not rely on the system parameters as a priori and provides a new solution for stabilization of the self motion of Stewart platforms. Theoretical analysis and results show that global convergence can be achieved for the neural network employed in this paper with dual dynamics. It is also shown to be optimal per the model free criterion. In this paper, we carried out numerical simulations which highlight and illustrate relatable performance capability in terms of model-free

[☆]This work is supported by the National Natural Science Foundation of China (with number 61401385), by Hong Kong Research Grants Council Early Career Scheme (with number 25214015), and also by Departmental General Research Fund of Hong Kong Polytechnic University (with number G.61.37.UA7L) and also by PolyU Central Research Grant (with number G-YBMU).

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