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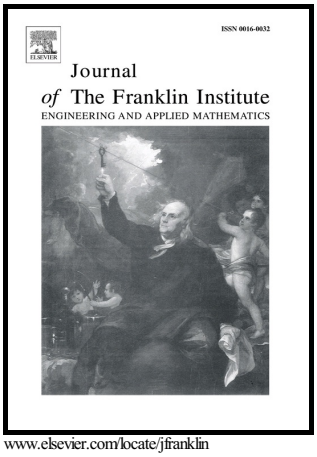

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A Common Functional Observer Scheme for Three Systems with Unknown Inputs

Jiunn Yea Ng[a], Chee Pin Tan[a,*], Hieu Trinh[b], Kok Yew Ng[a]

[a]*School of Engineering, Monash University, Malaysia*
[b]*School of Engineering, Deakin University, Australia*

Abstract

This paper presents a novel common functional observer scheme for three systems with unknown inputs. The scheme uses three observers in cascade with two logic switches. The existence conditions of the scheme are investigated and presented in terms of the original system matrices. Significantly, the conditions allow the observers to be designed independently of each other which greatly simplify the design process, and also serve as a basis of comparison for future development of common functional observer schemes. A numerical example is given to illustrate the effectiveness of the proposed scheme.

Keywords: Common observers, simultaneous observation, functional state estimation, unknown input observers.

1. Introduction

In most dynamic systems, an observer [1] is usually used to estimate the states which are not fully measurable, and yet are needed for feedback control. Using the measured outputs, control inputs and system model to estimate the states, an observer is inexpensive and easy to modify as it is computer-implemented. Examples of observer formulations, design methods and applications are found in [2, 3, 4, 5, 6, 7, 8].

*Corresponding author
Email addresses: ng.jiunn.yea@monash.edu (Jiunn Yea Ng), tan.chee.pin@monash.edu (Chee Pin Tan), hieu.trinh@deakin.edu.au (Hieu Trinh), ng.kok.yew@monash.edu (Kok Yew Ng)

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