(1)

Microcontroller Implementation for DC Motor Speed and Position Control

Mohamed A. Darwish, Hossam S. Abbas, Awad I. Saleh, and Mohamed M. M. Hassan.

Abstract:

This paper presents the design and experimental implementation of a Fuzzy logic controller (FLC) for a DC servomotor speed and position control. The motivation to utilize the FLC is its robustness against model's parameters inaccuracy and uncertainty. The implementation of the FLC algorithm is carried out by a low cost 8-bit microcontroller instead of using expensive general purpose microprocessors which are commonly employed in practice. This leads to a reasonable hardware cost for such applications. The experimental results in terms of reference tracking and disturbance rejection show high performance with the FLC approach in comparison with PI and PD controllers designed for the same purposes.

Keywords:

DC motor control, Fuzzy logic controller, Mamdani Type Fuzzy Controller, Microcontroller

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(2)

LPVIOID- A LPV IDENTIFICATION TOOLBOX FOR MATLAB: RECENT AND NOVEL TECHNIQUES

Mustafa Rabeei, Hossam S. Abbas and Mohamed M. Hassan

Abstract:

In this paper a system identification toolbox for MATLAB is introduced, including a user friendly graphical user interface. The toolbox is appropriate for the identification of systems in discrete-time linear parameter varying (LPV) form. Using LPVIOID1 it is possible to identify input-output models in open-loop and closed-loop settings based on experimental data. It comprises several recent LPV identification techniques. Furthermore, a novel method for identifying unstable plants in closed-loop is proposed. The toolbox is equipped with several tools for model validation. Examples for illustration are included.

Keywords:

Linear parameter varying systems, system identification, non-linear modelling.

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(3)
Disctetization of Closed-loop Systems

Awad I. Saleh, Mohamed M. Hasan, and Noha M. M. Darwish

Abstract:

The problem of converting existing continuous-time (CT) control systems into digital control systems is considered. The objective of this paper is to review, modify and compare three methods to obtain the discrete-time (DT) controller that take the closed-loop behavior into consideration. The first method is the partial compensation for ZOH effect method, it enhances the performance of discretized controllers in order to partially compensate the ZOH effect of the closed-loop digital control system, and to preserve the stability of the closed-loop digital control system. A modified approach is considered to improve the stability of the closed-loop digital system. The second method is the frequency response matching method, it is based on matching the frequency response of the digital control system to that of the continuous system with a minimum weighted mean-square error in the w-domain to obtain the parameters of the DT-controller. The third method is the plant input method, it is an indirect design method, which guarantees a stable control system when the DT-controllers are used to replace the CT-controllers. In this method the stability is assured for any sampling period used in pratice and even for unstable plants.

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(4)
Discretization of Closed-Loop Systems

Awad I. Saleh ; Mohamed M. M. Hasan and Noha M. M. Darwish

Abstract:

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(5)

Design of Robust Load Frequency Controller For a Hydrothermal Power System Using Q-parametrization Theory

Ahmed Nabil A. Mohamed, Mohamed M. M. Hasan, and Abdelfatah M. Mohamed

Abstract:

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Keywords:

NULL

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