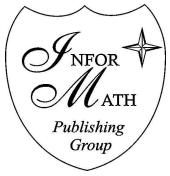
Nonlinear Dynamics and Systems Theory, **16** (3) (2016) 221–234



Dwell Time Stability Analysis for Nonlinear Switched Difference Systems

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Received: January 31, 2016; Revised: June 8, 2016

Abstract: This paper addresses the stability problem for a set of switched nonlinear difference equations with parametric uncertainties. For the corresponding family of subsystems, a regularization procedure is suggested, and a multiple Lyapunov function is constructed. With the aid of the Lyapunov function, classes of switching signals are determined for which the asymptotic stability of a stationary solution of a given set of equations may be guaranteed. An application of the proposed approach to the stability analysis of multiconnected switched difference systems by nonlinear approximation is presented. An example is given to illustrate our results.

Keywords: *difference systems; switching law; stability; comparison equations; dwell-time; multiple Lyapunov functions; complex systems.*

Mathematics Subject Classification (2010): 39A22, 39A30.

1 Introduction

A general outline of the theory of set equations is presented in the monograph [18], where it is shown that classical results of qualitative theory of equations under an appropriate adaptation can be applied to the analysis of equations in metric spaces. The most effective methods are the method of integral inequalities [19], the Lyapunov direct method [22, 28] and the comparison method based on the use of scalar [11, 12], vector [25] and matrix-valued Lyapunov functions [22].

Difference equations are of great interest due to their wide applications in the modeling of real world processes in which states of systems are measured not continuously but at some fixed instants of time [1, 3, 16, 20]. Sets of difference equations with switching are

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