

HYERS-ULAM STABILIZATION ANALYSIS FOR KHAYYAM FRACTIONAL INITIAL VALUE PROBLEMS

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Abstract. This article deals with stabilization analysis of the Hyers-Ulam type for a certain class of linear local fractional initial value problems of order $0 < \alpha \leq 1$. In this paper, we choose a very popular extension of the conformable fractional derivatives and equip our fractional initial value problems with them. The analysis is based on some sufficient conditions on nonlinearities that give us Hyers-Ulam type stability of the related initial value problems. Theoretical findings will be examined with numerical examples to illustrate that the proposed stability criterion is valid in practice.

Keywords. Local fractional calculus, Linear initial value problems, Hyers-Ulam stability.

AMS (MOS) subject classification: 26A33, 34A08, 34D20.

1 Introduction

One of the most important and most interesting research-lines on dynamical systems is stabilization of dynamical systems of the first order initial value problems. In viewpoint of engineering, unabling to stablize real life phenomena leads our lives to an uncontrollable chaotic mega system. So, this is necessary to study the stability of dynamical systems as generating resources of the natural and real life dynamical models. It is known fact that investigation on the stabilization of linear first order initial value problems is basis of the nonlinear generalizations. Therefore, it is reasonable that why we are interested in the research on the stability of linear dynamical systems. A general insight in the literature shows that there are wide range of stabilization approaches of dynamical systems such as the Lyapunov stability strategies