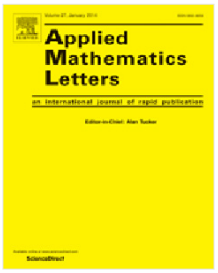
Accepted Manuscript



A numerical solution for variable order fractional functional differential equation

Yun-Tao Jia, Min-Qiang Xu, Ying-Zhen Lin

PII: S0893-9659(16)30253-1
DOI: http://dx.doi.org/10.1016/j.aml.2016.08.018
Reference: AML 5082

To appear in: *Applied Mathematics Letters*

Received date : 18 July 2016
Revised date : 28 August 2016
Accepted date : 28 August 2016

Please cite this article as: Y. Jia, et al., A numerical solution for variable order fractional functional differential equation, *Applied Mathematics Letters* (2016), http://dx.doi.org/10.1016/j.aml.2016.08.018

A numerical solution for variable order fractional functional differential equation

Yun-Tao Jia, Min-Qiang Xu*, Ying-Zhen Lin

School of Science, Zhuhai Campus, Beijing Institute of Technology, Zhuhai, Guangdong, 519085

Abstract

This paper is concerned with an efficient numerical scheme for variable order fractional functional boundary value problems. The algorithm relies on the simplified reproducing kernel method (SRKM). The convergence of the method is proven, followed by estimates on approximate solution. A numerical example with exact solutions is studied to demonstrate the performance of the method. Results obtained by the method indicate the algorithm performs extremely well in terms of accuracy, efficiency and simplicity.

Keywords: Variable fractional order; Functional differential equation; Simplified reproducing kernel method.

1 Introduction

A great quantity of nature phenomena can be modeled by variable fractional differential equations. The study of such problems has attracted much attention recently. Results about existence and uniqueness results for boundary value problems of fractional differential equations have been obtained in[1]-[2]. On the other side, several numerical methods, including finite difference method, matrix approach and reproducing kernel method, for solving variable-order fractional differential equations were proposed in [3]-[8]. At the mean time, Sun and Chen detailed described some valuable applications of variable fractional derivative in [9]-[11]. Functional differential equations arose in a variety of applications, such as electrodynamics, astrophysics, nonlinear dynamical systems, probability theory on algebraic structure. Consequently, several research papers were issued to investigate the theory and solutions of some functional differential equations (see[12]-[14] and references therein).

However, limited work has been done in the study on variable order fractional functional equation. In this letter, based on previous work [15]-[20], we focus on providing

E-mail address: mqxu_math@126.com