Nonlinear Dynamics and Systems Theory, **20** (5) (2020) 502–511

Conform Fractional Semi-Dynamical Systems

M. Elomari*, S. Melliani and L. S. Chadli

Laboratory of Applied Mathematics and Scientific Calculus, Sultan Moulay Slimane University, BP 523, 23000, Beni Mellal, Morocco.

Received: July 15, 2018; Revised: October 30, 2020

Abstract: The aim of this work is to present the notion of a conform semi-dynamical system, unlike the concept of a dynamical system, here we can work with the continuous functions. Some examples are presented to illustrate the result of the autonomous case.

Keywords: *conform dynamical systems; orbit; omega-set limit; autonomous system.*

Mathematics Subject Classification (2010): 37-XX, 37Cxx, 34Cxx, 34Dxx.

1 Introduction

Fractional calculus is generalization of ordinary differentiation and integration to arbitrary non-integer order. The subject is as old as the differential calculus, starting from some speculations of G.W. Leibeniz (1967) and L. Euler (1730) and since then, it has continued to be developed up to nowadays. Integral equations are one of the most useful mathematical tools in both pure and applied analysis. This is particularly true for problems in mechanical vibrations and the related fields of engineering and mathematical physics. We can find numerous applications of differential and integral equations of fractional order in finance, hydrology, biophysics, thermodynamics, control theory, statistical mechanics, astrophysics, cosmology and bioengineering. We recall that the fractional partial derivatives are difficult to handle analytically, especially those describing real world processes, and the researchers sometimes have to rely on the numerical methods to solve these equations. One of the well-known fractional derivatives is the Riemann-Liouville fractional order derivative, which is not always appropriate for modeling real world problems. The second one is the so-called Caputo derivative, this one is opposite with relation to displaying physical field complications and has been intensively used for this purpose.

* Corresponding author: mailto:mhamedmaster@gmail.com