Dynamics of Continuous, Discrete and Impulsive Systems
Series **B:** *Applications & Algorithms* **31 (2024)** 247-262

INVESTIGATING A CLASS OF GENERALIZED CAPUTO-TYPE FRACTIONAL VOLTERRA SYSTEMS

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Abstract. This research work is related to study a class of hybrid integro-differential equations (HIDEs) using conformable fractal-fractional derivative (CFFD). To establish the condition of at least one solution to the said problem, Krasnoselskii's fixed point theorem is considered. Stability results are derived by the use of Ulam-Hyers (U-H) and U-H Rassias. At the end of the paper, we added two pertinent examples for the purpose of justification and strengthen of our derived results.

Keywords. Conformable calculus, Hybrid problem, Ulam-Hyers stability, HIDE, CFFD.

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

1 Introduction

Boundary value problems (BVPs) are important for characterizing a wide range of real world engineering and physical research challenges. Much research has been done in the field of BVPs, which correspond to both ordinary and fractional order differential equations. Using functional analytic tools for qualitative theory, researchers have examined many BVPs. We refer [12], [34] and references there in for more details about BVPs. In [29], authors accumulated various BVPs concerned to real world problems of mathematical physics. Applications for BVPs with integral boundary conditions can be found in a wide range of fields, including population dynamics, chemical engineering, thermo-elasticity, blood flow issues, physical systems, thermodynamics, and other dynamics (see [2]). In recent decades, FDEs have gained much attention due to their wide use in these branches of science. Being the generalization of classical derivatives,the importance of fractional calculus is started at the same time as ordinary calculus were [21]. Using such types of fractional order derivatives have numerous benefits [22] Various definitions were defined by some researchers but the prominent role is of Riemann-Liouvile and Coputo arbitrary order [3, 25].

Recently, Atangana in [4] introduced the fractal-fractional derivatives (FFDs). Moreover, a relationship established between fractional and fractal