

ON NEW UNIQUENESS RESULTS FOR RIEMANN-LIOUVILLE FRACTIONAL VOLTERRA-FREDHOLM INTEGRO-DIFFERENTIAL EQUATIONS WITH DEVIATING ARGUMENTS

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Abstract. In this article, we explore the presence and singular nature of solutions for non-linear initial value problems (IVPs) encompassing fractional Volterra-Fredholm integro-differential equations with advanced arguments of a Riemann-Liouville (R-L) fractional nature. The distinctiveness of the solution is derived through the application of a Banach fixed point theorem utilizing a weighted norm. Additionally, by employing a monotone iterative approach, we establish the existence of exceptional solutions. The outcomes are demonstrated through illustrative examples.

Keywords. Fractional integro-differential equation, Volterra-Fredholm deviating arguments, initial condition, Fixed point method.

AMS (MOS) subject classification: 26A33, 34K20, 47H10.

1 Introduction

The exploration of fractional differential and integral equations is a relatively recent endeavor. Notable references in this area include the works of Kilbas et al. [1], Podlubny [2], and others. Integro-differential equations are of great interest due to their extensive applications across various scientific and technological fields, encompassing natural and engineering domains. These equations arise when boundary values of a function are related to its values within the domain, carrying physical significance such as total mass and moments see ([3, 4, 5, 6, 7, 23]). In certain cases, integral conditions prove to be more precise measures than local conditions. Several recent papers have focused on the existence, uniqueness and other properties of solutions for specific forms of FIDEs as documented see ([10, 11, 12, 13, 14, 19, 21]). In