MONOTONE ITERATIVE TECHNIQUE FOR CAPUTO FRACTIONAL DIFFERENTIAL EQUATIONS WITH VARIABLE MOMENTS OF IMPULSE

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Abstract. In this paper we study monotone iterative technique for the solution of initial value problem of impulsive Caputo fractional differential equations of order $q$, $0 < q < 1$, with variable moments under the weakened hypothesis of $C^p$ continuity.

Keywords. Impulsive Caputo fractional differential equations, existence, upper and lower solutions, monotone iterative technique.

AMS (MOS) subject classification: 34A08, 34A37, 34K07, 34K45, 26A33.

1 Introduction

The theory of fractional calculus is as old as classical calculus. The origins of fractional calculus can be traced back to the end of the seventeenth century. In a letter correspondence with Gottfried Wilhelm Leibniz (1646-1716), Marquis de L’Hopital (1661-1704) asked "What if the order of the derivative is $\frac{1}{2}$?" In his reply, dated 30 September 1695, Leibniz wrote to L’Hopital as follows: "... This is an apparent paradox from which, one day, useful consequences will be drawn. ..."

We can find numerous applications in various fields like viscoelasticity, electromagnetic, electrical networks, control theory, electrical circuits, medicine, chemistry, aerodynamics, porous media, electrodynamics of complex medium, electrochemistry and fluid mechanics etc. The first application of fractional calculus was made by Abel(1802-1829) in the tautochronous problem. There has been a significant development in the theory of fractional calculus in recent years. The applications and major contributions in this field are given in [6, 14, 15, 16, 19, 20, 21, 26, 28, 30] and the references therein. The geometric and physical interpretation of fractional integration and