MONOTONE ITERATIVE TECHNIQUE FOR HYBRID CAPUTO FRACTIONAL DIFFERENTIAL EQUATIONS

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Abstract. In this paper we develop the monotone iterative technique for
hybrid Caputo fractional differential equations which are Caputo fractional differential equations with fixed moments of impulse. In order to prove this result we use the weakened assumtion of C^q - continuity in place of local Hölder continuity.

Keywords. Hybrid Caputo fractional differential equations, Monotone iterative technique, Existence.

AMS (MOS) subject classification: 34K07, 34A08.

1 Introduction

The theory of fractional differential equations has been attracting the attention of many research scientists due to its potential in theory and its importance in numerous applied fields like Fluid flow, Viscoelasticity, Electrochemistry of fusion, Diffusive transport akin to diffusion and nano physics, to name a few. There is a vast amount of literature available on this important area and some of important publications are [1, 2, 4, 7, 8, 9, 12, 15, 16]. Further it is observed that many evolution processes are characterized by the fact that at certain moments of time they experience a change of state abruptly. This abrupt change is considered as a short term perturbation whose duration is negligible and we assume that these perturbations act instantaneously, in the form of impulses. Thus impulsive systems [6] form a better description when modelling physical phenomena.

Understanding the importance of the above fore mentioned areas of mathematics, we combine both these fields and consider hybrid fractional differential equations of Caputo type when the impulses occur at fixed moments of time. In this context, we define an upper solution, lower solution and proceed to develop the monotone iterative technique [5] which is a theoretical