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APPROXIMATING SOLUTIONS OF NONLINEAR INTEGRO DIFFERENTIAL EQUATIONS WITH RETARDATION AND ANTICIPATION

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Abstract. In this paper, the authors developed a technique for the existence and approximations of the solutions for nonlinear integro differential equations with anticipation and retardation under generalized monotonicity conditions using hybrid fixed point theorem of Dhage in partially normed linear spaces and are obtained under weaker partial continuity and partialcompactness type conditions.

Keywords. Integro differential equations, Hybrid fixed point theorem, Arzella-Ascolli theorem, Partially ordered Banach space, Approximating solutions.

AMS (MOS) subject classification: 34A12, 45J05.

1 Introduction

Integro differential equations appear to be suitable models to investigate problems in biology and social sciences. The study of nonlinear integro differential equations with retardation and anticipation via successive approximations has been a topic of great interest since long time. Picard's successive approximation method is a constructive method for the nonlinear first order integro differential equations converging to a unique solution of the corresponding differential equations. This method is frequently used for nonlinear equations in the nature . The existence and uniqueness of solutions for IDE are generally established by transforming the IDE into an equivalent integral equations and applying several fixed point theorems. It employs the Lipschitz condition of the nonlinearities together with a certain restriction on Lipschitz constant. Many attempts have been made in the literature to weaken the Lipschitz condition for the existence of unique solution of nonlinear equations. Nieto and Lopez [11] weakened Lipschitz condition to partial Lipschitz condition guaranteeing the conclusion of the Picard's method under certain additional conditions. But in any circumstances the hypothesis of Lipschitz condition is unavoidable to guarantee the conclusion of Picard's method for