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EXISTENCE AND UNIQUENESS OF SOLUTIONS FOR THE NEUTRAL FRACTIONAL INTEGRO DIFFERENTIAL EQUATIONS

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Abstract. In this paper, we study the existence and uniqueness of solutions for the neutral Caputo fractional integro-differential equations with fractional integral conditions by means of the Arzela-Ascoli's theorem, Leray-Schauder nonlinear alternative and the Krasnoselskii fixed point theorem. New conditions on the nonlinear terms are given to pledge the equivalence.

Keywords. Caputo fractional derivative, Neutral integro-differential equation, Leray-Schauder nonlinear alternative, Fixed point theorem.

AMS (MOS) subject classification: 26A33, 34A08, 34B15.

1 Introduction

Differential and integro-differential equations are often more realistic to describe natural phenomena and they arise in many areas of applied mathematics. Fractioanl differential equation is a generalization of ordinary differential equations and integration to arbitary non integer order (refer [12, 19, 28], and the cited references). In the fractional calculus the various integral inequalities plays an important role in the study of qualitative and quantitative properties of solution of differential and integral equations [6, 10, 11, 12, 18, 24, 25, 26].

In recent years, many authors focus on the development of techniques for discussing the solutions of fractional differential and integro-differential equations. For instance, we can remember the following works:

Ibrahim and Momani [16] studied the existence and uniqueness of solutions of a class of fractional order differential equations, Karthikeyan and Trujillo [18] proved existence and uniqueness of solutions for fractional integro-differential equations with boundary value conditions, Bahuguna and Dabas [3] applied the method of lines to establish the existence and uniqueness of a strong solution for the partial integro-differential equations, Matar [21] deliberated the existence of solutions for nonlocal fractional semilinear integro-differential equations in Banach spaces via Banach fixed point theorem.