

ON A CAPUTO TYPE FRACTIONAL INTEGRO-DIFFERENTIAL INCLUSION*

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Abstract

A Cauchy problem associated to a fractional integro-differential defined by a Caputo type fractional derivative is studied. It is proved the arcwise connectedness of the solution set and that the set of selections corresponding to the solutions of the problem considered is a retract of the space of integrable functions on a given interval.

MSC: 34A60, 26A33, 34B15.

keywords: differential inclusion, fractional derivative, Cauchy problem, decomposable set.

1 Introduction

In the last years one may see a strong development of the theory of differential equations and inclusions of fractional order ([4, 11, 13, 14] etc.). The main reason is that fractional differential equations are very useful tools in order to model many physical phenomena. In the fractional calculus there are several fractional derivatives. From them, the fractional derivative introduced by Caputo in [6] allows to use Cauchy conditions which have physical meanings.

A Caputo type fractional derivative of a function with respect to another function ([13]) that extends and unifies several fractional derivatives existing in the literature like Caputo, Caputo-Hadamard, Caputo-Katugampola

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