Dynamics of Continuous, Discrete and Impulsive Systems
Series **A:** *Mathematical Analysis* **25 (2018)** 373-396
 http://www.watam.org

WEAK SOLUTIONS FOR FRACTIONAL INTEGRODIFFERENTIAL EQUATIONS WITH MULTI-POINT BOUNDARY CONDITIONS IN NONREFLEXIVE BANACH SPACES

Baolin Li[1] and Haide Gou[2]

[1]Department of Mathematics
Northwest Normal University, Lanzhou, PR China

[2]Department of Mathematics
Northwest Normal University, Lanzhou, PR China

Abstract. In this paper, by using some fixed point theorem and the technique of measure of weak noncompactness, we establish the existence of weak solutions of multi-point boundary value problem for fractional integro-differential equations in nonreflexive Banach spaces.

Keywords. weak solutions; Henstock-Kurzweil-Pettis integral; Measure of weak noncompactness; Boundary value problem.

AMS (MOS) subject classification: 34G20, 47H40, 45B05, 34B10.

1 Introduction

Fractional differential equations arise in many engineering and scientific disciplines as the mathematical modelling of systems and processes in the fields of physics, chemistry, aerodynamics, electrodynamics of complex medium, polymer rheology, and been emerging as an important area of investigation in the last few decades, see [1-5]. The existence of weak solutions for ordinary differential equations in Banach spaces has been studied in the literature and for a review of this topic we refer the reader to [4,6,7].

In recent yeas, fractional differential equations in Banach spaces has been studied and a few papers consider fractional differential equations in reflexive Banach spaces equipped with the weak topology. As long as the Banach space is reflexive, the weak compactness offers no problem since every bounded subset is relatively weakly compact and therefore the weak continuity suffices to prove nice existence results for differential and integral equations [25,26]. De Blasi [13] introduced the concept of measure of weak noncompactness and proved the analogue of Sadovskiis fixed point theorem for the weak topology (see also [27]). As stressed in [28], in many applications, it is always not possible to show the weak continuity of the involved mappings, while the sequential weak continuity offers no problem. This is mainly due to the fact that Lebesgues dominated convergence theorem is valid for sequences