IMPLICIT HADAMARD FRACTIONAL DIFFERENTIAL EQUATIONS WITH IMPULSES UNDER WEAK TOPOLOGIES

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Abstract. By applying fixed point theory and the technique of weak measures of noncompactness, the authors prove the existence of weak solutions for some classes of implicit Hadamard fractional differential equations with instantaneous and noninstantaneous impulses.

1   Introduction

Fractional differential equations have recently been applied in various areas of engineering, mathematics, physics and bio-engineering, and other applied sciences [21, 29]. For some fundamental results in the theory of fractional calculus and fractional differential equations we refer the reader to the monographs of Abbas *et al.* [4, 5], Samko *et al.* [28], Kilbas *et al.* [23] and Zhou [32, 33].

Impulsive differential equations have become more important in recent years in some mathematical models of real phenomena, especially in the biological and medical sciences and in control theory; see, for example, the