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TRIPLE POSITIVE SOLUTIONS TO BVP FOR P-LAPLACIAN IMPULSIVE DYNAMIC EQUATIONS ON TIME SCALES

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Abstract. The five functionals fixed point theorem is applied to investigate the existence of at least three positive solutions of boundary value problems for p-Laplacian impulsive functional dynamic equations on time scales.

Keywords. Time scale; p-Laplacian; Positive solution; Five functionals fixed point theorem; Impulsive differential equation; Boundary value problem.

AMS (MOS) subject classification: 34B37.

1 Introduction

The study of dynamic equations on time scales (or measure chains) goes back to its founder Hilger [14] and is undergoing rapid development, and this provides a unifying structure for the study of differential equations in the continuous case and the study of finite difference equations in the discrete case; see [2,5,6,10,11,13-16,25] and reference therein. Some basic definitions and theorems on time scales can be founded in the book [10] and another excellent source on time scales is the book [11]. A time scale (or measure chain) $\mathbb{T}$ is a closed nonempty subset of R. We assume that $\mathbb{T}$ has the subspace topology inherited from the Euclidean topology on R. For notation, we shall use the convention that, for each interval J of R, $J_{\mathbb{T}} = J \cap \mathbb{T}$.

On the other hand, impulsive differential equations have become an important aspect of differential equations as it occurs in many applications: physic, population dynamic, ecology, biological systems etc. Therefore, the study of this class of dynamical systems has gain prominence and it is a rapidly growing field. At present, some qualitative properties such as oscillation, asymptotic behavior, stability and existence of solutions are investigated extensively by many authors [3,4,18-24,26]. However, as far as we know, only a little work has been done for boundary value problem (BVP) for impulsive dynamic equations on time scales [1,9,12,17].