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COMPARISON RESULTS AND APPROXIMATION OF SOLUTIONS FOR IMPULSIVE FUNCTIONAL DIFFERENTIAL EQUATIONS

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Abstract. We present new maximum principles which improve some previous results and develop the monotone method for a periodic boundary value problem for a nonlinear impulsive functional differential equation, giving conditions for the existence of extremal solutions between a lower and an upper solution. We consider different types of functional dependence in the equation.
Keywords. Maximum principle, Impulsive functional differential equation, Periodic boundary value problem, Lower (upper) solutions, Monotone method.
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1 Introduction

Many real evolution processes are continuously distributed, but short-term forces are described mathematically as instantaneous. Impulsive Differential Equations (IDE) serve as models to study the evolution of processes that are subject to sudden changes in their states.

Impulsive Differential Equations is an active area of research [9], [16]-[22]. For some general mathematical aspects of IDE we refer to [1], [8], [23]. Functional Impulsive Differential Equations are studied, for example, in [3]-[6], [19], [27], and, recently, in [12], [30], [31]. Impulsive differential equations find many applications. For example, to control and synchronize Chua's oscillators [25], to control Lü's chaotic system [2], to study Hopfield-type neural impulsive networks [13], to study a predator-prey system with impulses on the predator [29], or to explain the rich dynamics in a three species food chain system [28]. A periodic impulsive logistic system is considered in [15], a periodic impulsive competing Lotka-Volterra model in [14], and impulsive lag synchronization of delay systems in [10]. In [24], random impulses for a differential equation are considered. The basic theory concerning monotone iterative technique is included in [7].