OSCILLATION OF SOME SECOND ORDER NONLINEAR IMPULSIVE DELAYED INTEGRODIFFERENTIAL EQUATION

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Abstract. The main object of this work is the study of the oscillation of the solution to some second order nonlinear impulsive integrodifferential equation with variable delays. We derive some sufficient conditions for which the solution is oscillatory, the former are given in terms of some divergent integrals.

Keywords. Impulses, delays, oscillation, Gronwall's impulsive inequality, Young's inequality.

AMS (MOS) subject classification: 34A37, 47D09, 34G20.

1   Introduction

Due to its various applications in different domains of life the theory of impulsive differential equations has attracted in the last decade more and more attention and significant results have been obtained, see for instance ([1], [3], [7], [8]) and the references therein. Actually, the theory of impulsive differential equations provides a natural framework for mathematical modelling of some evolving processes subjected to abrupt changes such as shocks, natural disasters, orbital transfer of satellites, etc. We mention that among the questions raised in the theory of impulsive differential equations is the oscillation of solutions of these problems. In fact, most of the investigators have mainly focused their attention on the oscillation of first order linear differential equations subject to appropriate impulses, see [6]; however, there are just few results devoted to the study of the oscillation of second order (or more) nonlinear delayed differential equations with impulses [4, 5, 9, 10].

Our contribution in this paper is the establishment of some useful oscillation criteria for certain second order nonlinear impulsive integrodifferential equation with variable delays by using a classical differential impulsive inequality of Gronwall's type. Moreover, since the integrodifferential equation in question contains fractional powers then we have first established that the solution is nonnegative in order to study its oscillatory character over the half ray $[t_0, +\infty)$.