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OSCILLATION AND NONOSCILLATION CRITERIA FOR IMPULSIVE DELAY DIFFERENTIAL EQUATIONS WITH PERRON INTEGRABLE COEFFICIENTS

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Abstract. We present new criteria for the existence of oscillatory and nonoscillatory solutions of measure delay differential equations with impulses. We deal with the integral forms of the differential equations using the Perron and the Perron-Stieltjes integrals. Thus the functions involved can have many discontinuities and be of unbounded variation and yet we obtain good results which encompass those in the literature. Examples are given to illustrate the main results.

Keywords. nonoscillation; oscillation; measure differential equations; delay differential equations; impulses; Perron integral; Perron-Stieltjes integral.

AMS (MOS) subject classification: 34K11; 26A39.

1 Introduction

Measure differential equations have been investigated by many authors, as for instance, W. Schmaedeke [19], P. Das and R. Sharma [7, 6] and others. The main purpose of the concept of measure differential equations is the description of systems exhibiting discontinuous solutions caused by the impulsive behavior of the differential system. The theory of measure differential equations allows us to encompass, for example, differential equations with impulses ([11, Theorem 3.1]) as well as dynamic equations on time scales ([10, Theorem 4.3]).

On the other hand, oscillations are an important property of particles in quantum mechanics and other areas of physics, with applications to many applied sciences such as Engineering, Finance, etc. In the present paper, we deal with a class of delayed measure differential equations subject to impulse action and we present oscillation and nonoscillation criteria of solutions.