OPTIMAL IMPULSIVE EFFECTS AND MAXIMUM INTERVALS OF EXISTENCE OF THE SOLUTIONS OF IMPULSIVE DIFFERENTIAL EQUATIONS

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Abstract. The main object of investigation is one class of nonlinear autonomous differential equations with non-fixed moments of impulsive effects. The impulsive moments coincide with moments, at which the integral curve meets the so-called "barrier set", situated in the extended phase space. This set coincides with the "barrier straight line", parallel to the axis of time. It matches with the contour of half-plane in which the integral curves of initial value problems lie. The impulsive effects are found, which are optimal in the following sense. Let:

1. Half-plane, determined by the barrier curve and containing the integral curves, which start from this half-plane is called an extended phase half-plane;
2. This type of integral curves (for any choice of initial point) intersect the barrier lines;
3. In the moments, when the appropriate impulsive effects across the barrier set, the integral curve moves instantaneously in the extended phase half-plane.

A set of impulsive effects, in which the integral curve has a maximum interval of existence in the extended phase half-plane is found in the paper.

Keywords. impulses, barrier line, optimization problem

AMS (MOS) subject classification: 34A37, 34H05

1 Introduction

The impulsive differential equations with variable moments of impulsive effects have many applications in solving various practical optimization problems. We will cite the following results: [1] - [10] and [13] - [30].

The concepts: barrier sets (in particular barrier curves); extended phase half-plane; impulsive effects, for which the moments of realization are determined by means of barrier sets and concept of continuous dependence of solutions with respect to these sets are introduced and investigated for the first time in [11] and [12].