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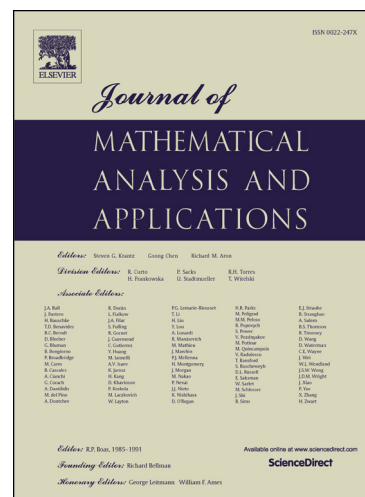
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Invariance and stability of global attractors for multi-valued impulsive dynamical systems

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Abstract

In this paper, we consider infinite-dimensional impulsive dynamical systems generated by evolution problems with impulses at the moments of intersection of trajectories with given subset of the phase space. Uniqueness of the corresponding Cauchy problem is not assumed, so we use multi-valued semiflows to describe the long-time dynamics of such systems. Considering global attractor as a compact minimal uniformly attracting set of the corresponding multi-valued semiflow we propose a criterion of existence of such a set. Under additional mild assumptions, we prove the invariance of the global attractor despite the fact that our approach does not require the invariance property of the set in the definition of the global attractor. Moreover, we prove that the obtained global attractor is stable under perturbation of the right-hand part of the evolution problem. We also provide examples which show that, in general, the global attractor is not preserved under perturbation of impulsive parameters.

Keywords: impulsive perturbation, multi-valued dynamical system, global attractor

2010 MSC: 35B40, 35B41, 35K55, 37B25, 58C06

1. Introduction

It is well-known that the evolution of many mechanical and physical processes exhibits a combination of continuous and discontinuous behaviour. One of the most popular mathematical tools of investigation of such processes is the theory of differential equations with jumps or impulsive differential equations [29],[21]. In this paper we consider autonomous evolution systems with

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