SOLUTIONS OF AN IMPULSIVE COMPARTMENTAL SYSTEM

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Abstract. In this paper, some necessary and/or sufficient conditions of existence of solutions for an impulsive compartmental system are obtained. By using such results, a class of coupled map lattice systems are considered.

Keywords. Impulsive compartmental system, coupled map lattice system, existence, oscillation, periodic solution.

AMS (MOS) subject classification: 34A45, 34A37.

1   Introduction

Partial functional differential equations arise from many biological, chemical, and physical systems which are characterized by both spatial and temporal variables and exhibit various spatio-temporal patterns. Thus, many results on partial functional differential equations are obtained by using various methods, concepts, and results from semigroup theory, dynamical system theory, linear and nonlinear functional analysis, ordinary and partial differential equations, and functional differential equations, see the monograph [1].

Many evolution processes are characterized by the fact that at certain moments of time they experience a change of state abruptly. That is, the impulsive phenomena usually arise from many applications. Recently there has been much interest in studying the impulsive partial functional differential equations of the form

$$
\begin{cases}
\frac{\partial^m}{\partial t^m}\left(u\left(x,t\right)-c\left(t\right)u\left(x,t-\tau\right)\right)=a\left(t\right)\frac{\partial^2 u(x,t)}{\partial x^2}+b\left(t\right)\frac{\partial^2 u(x,t-\sigma)}{\partial x^2}\\
\quad -p\left(t\right)u\left(x,t-\eta\right)+q\left(t\right)u\left(x,t-\xi\right)-r\left(t\right)f\left(u\left(x,t-\omega\right)\right)\\
\quad\quad u\left(x,t_k^+\right)-u\left(x,t_k\right)=b_k u\left(x,t_k\right),k=1,2,\cdots.
\end{cases}
\tag{1}
$$

See [2-4].

By means of standard finite difference methods, the space discrete analogs