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BOUNDEDNESS AND PERIODICITY FOR IMPULSIVE FUNCTIONAL DIFFERENTIAL EQUATIONS WITH APPLICATIONS TO IMPULSIVE DELAYED HOPFIELD NEURAL NETWORKS

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Abstract. In this paper, we study the boundedness and periodicity of solutions of impulsive functional differential equations. Some new criteria on the boundedness and existence of periodic solutions are established by applying component Liapunov function and Hale-Yoshizawa type criteria. These criteria are also used to investigate a class of impulsive delayed Hopfield neural networks.

Keywords. Impulsive differential equation; Periodic solution;Boundedness; Hopfield neural network; Component Liapunov function.

AMS (MOS) subject classification: 34B37, 34B40.

1 Introduction and Preliminaries

The mathematical theory of impulsive differential equations has been developed very intensively, see [1-8] and the references cited therein. One of the important research area in the qualitative theory of the impulsive differential equations is the existence of periodic solutions. As we know, the problem of establishing the existence of periodic solutions of functional differential equations without impulses via the boundedness of solutions has been the subject of many investigations since the work of Massera [9]. By applying Horn's fixed point theorem, Hale [6] and Yoshizawa [10] proved that if solutions are uniformly bounded (UB) and uniformly ultimate bounded (UUB) for bound B, then the corresponding functional differential equations without impulses have a periodic solution, that is called Hale-Yoshizawa type criteria. In last 30 years, it has been extensively exploited in the study of periodic solutions of various differential equations without impulsive effects, see [3,4,11,12,13] and the references cited therein. Recently, Jianhua Shen et al.[14] obtained the counterpart results for impulsive functional differential equations.