

GLOBAL EXISTENCE AND BOUNDEDNESS ON A CERTAIN NONLINEAR INTEGRO-DIFFERENTIAL EQUATION OF SECOND ORDER

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Abstract. In this paper, we give new criteria for global existence and boundedness of solutions on a certain nonlinear integro-differential equation of second order. The technique of the proof is based on an appropriate Lyapunov function. We provide a numerical example to confirm the effectiveness of the theoretical result. Our result extends and improves the results obtained by Napoles Valdes [13].

Keywords. Integro differential equation, second order, global existence, boundedness, Lyapunov function.

AMS (MOS) subject classifications: 34A12, 34C11.

1 Introduction

It is well known that differential and integro-differential equations of second order play extremely important and useful roles in many scientific areas such as atomic energy, biology, chemistry, control theory, economy, engineering, information theory, mechanics, medicine, physics, etc. By this time, qualitative properties of differential and integro-differential equations of second order have been investigated in the literature by many researchers (see [1-20]). However, we would not like to give the details of works done and applications of those equations. Further, in particular, for some work done on global existence and boundedness of solutions on certain nonlinear differential and integro-differential equations of second order, the readers can refer to the papers or books of Ahmad and Rama Mohana Rao [1], Baxley [2], Burton [3], Changjian et al. [4], Constantin [5], Fujimoto and Yamaoka [6], Graef and Tunc [7], Kalmanovskii and Myshkis [8], Krasovskii [9], Miller [10], Miller and Michel [11], Mustafa and Rogovchenko [12], Napoles Valdes [13], Tidke and Dhakne [14], Tidke [15], Tiryaki and Zafer [16], Wu et al. [17], Yin [18], Yoshizawa [20] and the references therein.

In 2001, Napoles Valdes [13] considered the integro-differential equation