NONNEGATIVE PERIODIC SOLUTIONS OF A TOTALLY NONLINEAR ITERATIVE DIFFERENTIAL EQUATION FOR A HOUSEFLIES MODEL BY USING KRASNOSELSKII-BURTON'S THEOREM

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Abstract. This paper studies the existence of nonnegative periodic solutions of a totally nonlinear iterative differential equation for a houseflies model. The equivalent integral equation of the given equation defines a fixed point mapping written as a sum of a large contraction and a compact map. The main results assert the existence of nonnegative periodic solutions by making use of Krasnoselskii-Burton's fixed point technique.

Keywords. Krasnoselskii-Burton's fixed point, large contraction, iterative differential equations, nonnegative solutions, periodic solutions.

AMS (MOS) subject classification: 34K13, 34A34, 34K30, 34L30.

1 Introduction

Delay or iterative differential equations have attracted considerable attention in mathematics during recent years since these equations have been showed to be valuable tools in the modeling of many phenomena in various fields of science, physics, chemistry and engineering, etc. In particular, periodicity, positivity and stability of solutions for delay or iterative differential equations has been studied extensively by many authors, see the references [1]-[3] and [5]-[11].

Recently, in [1], the authors discussed the existence and positivity of periodic solutions for the first-order delay differential equation

$$\varkappa'(\mathfrak{t}) = -r(\mathfrak{t})g(\varkappa(\mathfrak{t})) + F(t, \varkappa(\mathfrak{t}-\tau(\mathfrak{t}))).$$

By employing Krasnoselskii-Burton's fixed point theorem, the authors obtained the existence results for positive periodic and periodic solutions.