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Positive Solutions for a Fourth Order Three Point Focal Boundary Value Problem

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Abstract: The authors consider a fourth order three point boundary value problem. Some a priori estimates to positive solutions for the boundary value problem are obtained. Sufficient conditions for the existence and nonexistence of positive solutions for the problem are established.

Keywords: *fixed point theorem; cone; nonlinear boundary value problem; positive solution.*

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1 Introduction

In this paper, we consider the fourth order differential equation

$$u''''(t) + g(t)f(u(t)) = 0, \quad 0 \le t \le 1, \tag{1}$$

together with the boundary conditions

$$u(0) = u'(p) = u''(1) = u'''(1) = 0. \tag{2}$$

Throughout this paper, we assume that

(H1) p is a real constant such that $1 - \sqrt{3}/3 \le p \le 1$, $f : [0, \infty) \to [0, \infty)$ and $g : [0, 1] \to [0, \infty)$ are continuous functions, and $g(t) \not\equiv 0$ on $[0, 1]$.

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