

POSITIVE SOLUTIONS FOR A SECOND-ORDER m -POINT BOUNDARY VALUE PROBLEM

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Abstract. We study the existence of positive solutions with respect to a cone for a second-order nonlinear system, subject to some m -point boundary conditions.

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1 Introduction

We consider the second-order nonlinear differential system

$$(S) \quad \begin{cases} u''(t) + \lambda b(t)f(v(t)) = 0, & t \in (0, T) \\ v''(t) + \mu c(t)g(u(t)) = 0, & t \in (0, T), \end{cases}$$

with the m -point boundary conditions

$$(BC) \quad \begin{cases} \beta u(0) - \gamma u'(0) = 0, & u(T) = \sum_{i=1}^{m-2} a_i u(\xi_i) \\ \beta v(0) - \gamma v'(0) = 0, & v(T) = \sum_{i=1}^{m-2} a_i v(\xi_i), \quad m \geq 3. \end{cases}$$

In this paper we shall present sufficient conditions for λ and μ such that positive solutions of (S), (BC) exist. The existence of positive solutions with respect to a cone for the system (S) with $T = 1$ with the boundary conditions

$$\begin{cases} \alpha u(0) - \beta u'(0) = 0, & \gamma u(1) + \delta u'(1) = 0, \\ \alpha v(0) - \beta v'(0) = 0, & \gamma v(1) + \delta v'(1) = 0, \end{cases}$$

where $\alpha, \beta, \gamma, \delta \geq 0$ and $\alpha + \beta + \gamma + \delta > 0$, has been studied in [7]. In [11] the authors have investigated the existence of positive solutions for the m -point boundary value problem on time scales $u^{\Delta \nabla}(t) + a(t)f(u(t)) = 0, t \in (0, T)$ with boundary conditions $\beta u(0) - \gamma u^{\Delta}(0) = 0, u(T) - \sum_{i=1}^{m-2} a_i u(\xi_i) = b, m \geq$