Dynamics of Continuous, Discrete and Impulsive Systems
Series **A:** *Mathematical Analysis* **18 (2011)** 353-361
 http://www.watam.org

EXISTENCE OF POSITIVE SOLUTIONS TO A SINGULAR SYSTEM OF BOUNDARY VALUE PROBLEMS

Naseer Ahmad Asif[1] , Rahmat Ali Khan[2] and Paul Eloe[3]

[1]Centre for Advanced Mathematics and Physics
National University of Sciences and Technology
Campus of College of Electrical and Mechanical Engineering, Peshawar Road,
Rawalpindi, Pakistan
naseerasif@yahoo.com

[2]University of Malakand, Chakadra Dir (L)
Khybar Phuktoonkwa, Pakistan
rahmat_alipk@yahoo.com

[3]Department of Mathematics
University of Dayton, Dayton, Ohio 45469-2316 USA

Corresponding author email:paul.eloe@notes.udayton.edu

Abstract. Existence of a positive solution for a system of nonlinear two-point boundary value problems of the type

$$\begin{aligned} -x''(t) &= p(t)f(t,x(t),y(t),x'(t)), \quad t \in (0,1), \\ -y''(t) &= q(t)g(t,x(t),y(t),y'(t)), \quad t \in (0,1), \\ x(0) &= x(1) = y(0) = y(1) = 0, \end{aligned}$$

is established. The nonlinearities $f, g : [0,1] \times (0,\infty) \times (0,\infty) \times \mathbb{R} \to \mathbb{R}$ are continuous and allowed to be singular at $x = 0$ and $y = 0$. The functions $p, q \in C(0,1)$ are positive on $(0,1)$. An example is provided to illustrate the applicability of our theory.

Keywords. Positive solution; Singular system of ordinary differential equations; Two-point boundary value problem; Lower and Upper solution.

AMS (MOS) subject classification: 34B16, 34B18

1 Introduction

Existence theory for boundary value problems (BVPs) of ordinary differential equations has attracted the attentions of many researchers, see for example, [5, 6, 8, 17] and the references therein. Due to applications of singular differential equations, a number of