

THE EXISTENCE OF POSITIVE SOLUTIONS OF SINGULAR STURM-LIOUVILLE BOUNDARY VALUE PROBLEMS ON A MEASURE CHAIN *

Saroj Panigrahi[†] Sandip Rout[‡]

Abstract

The authors study the existence of positive solutions of singular Sturm-Liouville boundary value problem

$$(p(t)y^\Delta(t))^\Delta + \lambda q(t)f(t, y^\sigma(t)) = 0, \rho(a) < t < \sigma(b),$$

with boundary conditions

$$\alpha y(\rho(a)) - \beta p(\rho(a))y^\Delta(\rho(a)) = 0,$$

$$\gamma y(\sigma(b)) + \delta p(\sigma(b))y^\Delta(\sigma(b)) = 0,$$

on a measure chain, where $\lambda > 0$ and q is allowed to be singular at both end points $t = \rho(a)$ and $t = \sigma(b)$. We shall use a fixed point theorem on a cone in a Banach space to obtain the existence of positive solutions for λ in a suitable interval of a measure chain.

MSC: 34B15, 34B16, 34B18, 34N05, 39A10, 39A13.

keywords: Positive solution, Sturm-Liouville boundary value problems, singular, fixed point theorem, cone.

* Accepted for publication on February 6-th, 2022

[†]panigrahi2008@gmail.com, School of Mathematics and Statistics, University of Hyderabad, Hyderabad - 500 046, India

[‡]sandiprout7@gmail.com, School of Mathematics and Statistics, University of Hyderabad, Hyderabad - 500 046, India; This work was supported by University of Hyderabad, Hyderabad - 500 046, India.