

## Accepted Manuscript

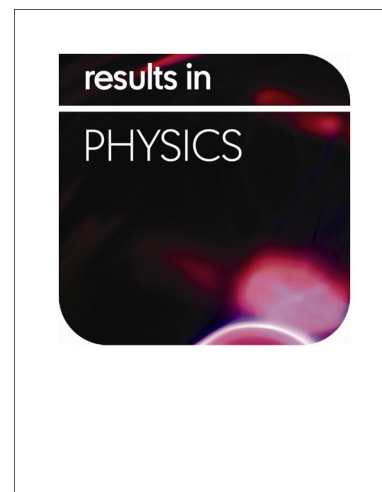
An Accurate Method For Solving a class of Fractional Sturm-Liouville Eigenvalue Problems

Bothayna S.H. Kashkari, Muhammed I. Syam

PII: S2211-3797(18)30090-1  
DOI: <https://doi.org/10.1016/j.rinp.2018.01.061>  
Reference: RINP 1218

To appear in: *Results in Physics*

Received Date: 11 January 2018  
Revised Date: 23 January 2018  
Accepted Date: 25 January 2018



Please cite this article as: Kashkari, B.S.H., Syam, M.I., An Accurate Method For Solving a class of Fractional Sturm-Liouville Eigenvalue Problems, *Results in Physics* (2018), doi: <https://doi.org/10.1016/j.rinp.2018.01.061>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# An Accurate Method For Solving a class of Fractional Sturm-Liouville Eigenvalue Problems

Bothayna S. H. Kashkari<sup>a</sup> & Muhammed I. Syam<sup>b</sup>

<sup>a</sup>Department of Mathematics  
Faculty of Science, AL Faisaliah  
King Abdulaziz University  
Jeddah - Saudi Arabia  
bkashkari@kau.edu.sa

<sup>b</sup>Department of Mathematical Sciences  
UAE University  
College of Science, P. O. Box 17551  
Al-Ain, United Arab Emirates  
m.syam@uaeu.ac.ae

February 2, 2018

## Abstract

This article is devoted to both theoretical and numerical study of the eigenvalues of nonsingular fractional second-order Sturm-Liouville problem. In this paper, we implement a fractional-order Legendre Tau method to approximate the eigenvalues. This method transforms the Sturm-Liouville problem to a sparse nonsingular linear system which is solved using the continuation method. Theoretical results for the considered problem are provided and proved. Numerical results are presented to show the efficiency of the proposed method.

**Key Words:** *Eigenvalues, Fractional second-order Sturm-Liouville problem, A fractional-order Legendre functions.*

**MCS 2010:** 65

## 1 Introduction

As of late an extraordinary hobby was committed to the investigation of boundary-value problem of fractional order. The significance of boundary value problems originates from the fact that they model different applications in fluid mechanics, visco-elasticity, physics, biology and economics which can't be displayed by differential mathematical statements with integer derivatives.

Download English Version:

<https://daneshyari.com/en/article/8208254>

Download Persian Version:

<https://daneshyari.com/article/8208254>

[Daneshyari.com](https://daneshyari.com)