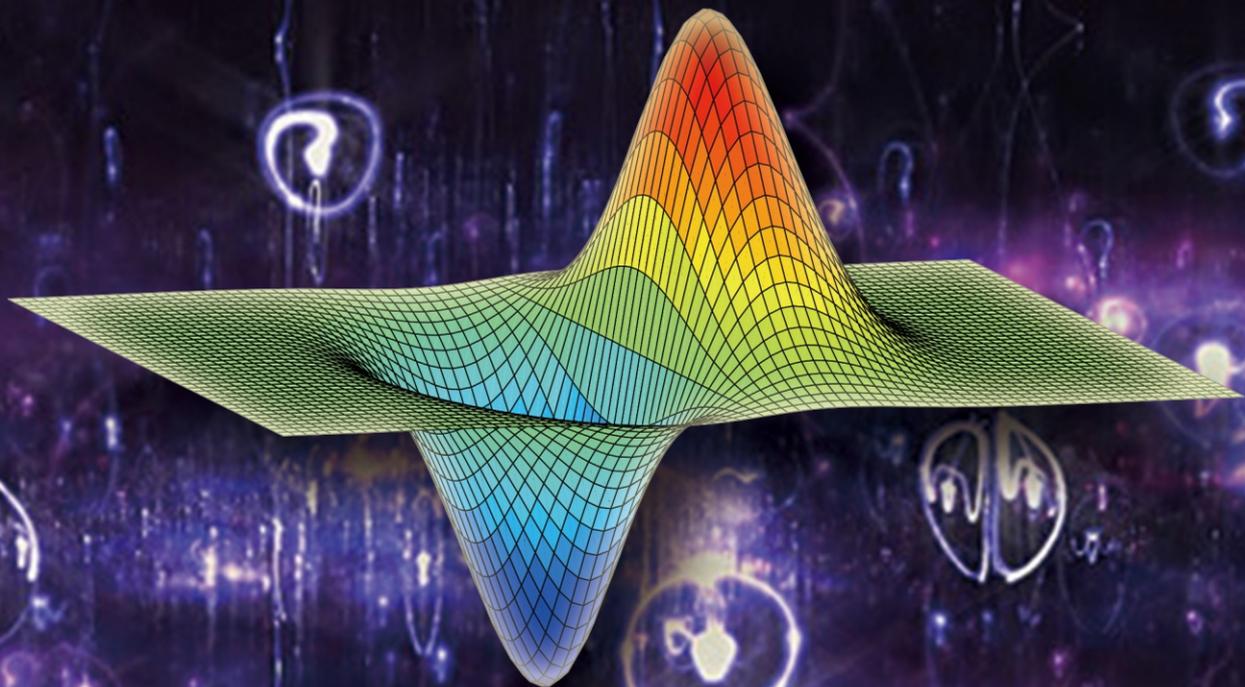


ISSN: 2160-0368 Volume 8, Number 4, April 2018



# Advances in Pure Mathematics



ISSN: 2160-0368



[www.scirp.org/journal/apm](http://www.scirp.org/journal/apm)

# Journal Editorial Board

ISSN 2160-0368 (Print) ISSN 2160-0384 (Online)

<http://www.scirp.org/journal/apm>

---

## Editor-in-Chief

**Prof. Dexing Kong**

Zhejiang University, China

## Editorial Board

**Dr. Taher S. H. Abdelmonem**

Mansoura University, Egypt

**Dr. Adel Ahmed Attiya**

Mansoura University, Egypt

**Prof. Józef Banas**

Bronislaw Markiewicz State School of Higher Vocational Education in Jaroslaw, Poland

**Prof. Constantin Buse**

West University of Timisoara, Romania

**Dr. Claudio Cuevas**

Federal University of Pernambuco, Brazil

**Prof. Leo Depuydt**

Brown University, USA

**Prof. Dragan S. Djordjevic**

University of Nis, Serbia

**Dr. Ozgur EGE**

Celal Bayar University, Turkey

**Prof. Ahmed M. A. El-Sayed**

Alexandria University, Egypt

**Prof. Marisa Fernandez**

Universidad del País Vasco, Spain

**Prof. Cristescu Gabriela**

Aurel Vlaicu University of Arad, Romania

**Prof. Hongya Gao**

Hebei University, China

**Prof. Aleksander Grytczuk**

University of Zielona Góra and Jan Pawel II Western, Poland

**Prof. Yuxia Guo**

Tsinghua University, China

**Dr. Sevdzhan Hakkaev**

University of Kansas, USA

**Dr. Chengchun Hao**

Chinese Academy of Sciences, China

**Prof. Tianxiao He**

Illinois Wesleyan University, USA

**Prof. Wei He**

Nanjing Normal University, China

**Prof. Tingzhu Huang**

University of Electronic Science & Technology of China, China

**Prof. Toshitake Kohno**

The University of Tokyo, Japan

**Prof. Vichian Laohakosol**

Kasetsart University, Thailand

**Dr. Jingjing Ma**

University of Houston-Clear Lake, USA

**Prof. Elimhan N. Mahmudov**

Istanbul Technical University, Turkey

**Dr. Lucia Marino**

Catania University, Italy

**Prof. Ming Mei**

McGill University, Canada

**Dr. M. T. Mustafa**

Qatar University, Qatar

**Dr. Marek Niezgod**

University of Life Sciences in Lublin, Poland

**Dr. Mahammad A. Nurmammadov**

Azerbaijan State Pedagogical University, Azerbaijan

**Prof. Jyotindra C. Prajapati**

Charotar University of Science and Technology, India

**Dr. Marius Rădulescu**

Institute of Mathematical Statistics and Applied Mathematics “Gheorghe Mihoc-Caius Iacob” of the Romanian Academy, Romania

**Prof. Jingli Ren**

Zhengzhou University, China

**Prof. Bayram Sahin**

Inonu University, Turkey

**Prof. Samir H. Saker**

Mansoura University, Egypt

**Dr. Bessem Samet**

Tunis College of Sciences and Techniques, Tunisia

**Dr. Yongli Song**

Tongji University, China

**Prof. Hari M. Srivastava**

University of Victoria, Canada

**Prof. Yeong-Jeu Sun**

I-Shou University, Chinese Taipei

**Dr. Néstor Thome**

Universitat Politècnica de València, Spain

**Prof. Aydin Tiryaki**

Izmir University, Turkey

**Prof. Gabor Toth**

Rutgers University, USA

**Prof. Amitabha Tripathi**

Indian Institute of Technology, India

**Prof. Nodari Vakhania**

Georgian Academy of Sciences, Mexico

**Prof. Qingwen Wang**

Shanghai University, China

**Dr. Yanjin Wang**

Institute of Applied Physics and Computational Mathematics, China

**Prof. Changjin Xu**

Guizhou Key Laboratory of Economics System Simulation, China

**Dr. Jasang Yoon**

University of Texas Rio Grande Valley, USA

**Prof. Mohamed F. Yousif**

The Ohio State University, USA

**Dr. Shijun Zheng**

Georgia Southern University, USA

**Prof. Changjiang Zhu**

South China University of Technology, China

# Table of Contents

**Volume 8    Number 4**

**April 2018**

<b>Existence of Solutions to a Class of Navier Boundary Value Problem Involving the Polyharmonic</b>	
Y. Y. Lan.....	373
<b>Facebook Dynamics: Modelling and Statistical Testing</b>	
J. Bavio, M. Guardiola, G. Perera.....	380
<b>An Efficient Proximal Point Algorithm for Unweighted Max-Min Dispersion Problem</b>	
S. Q. Tao.....	400
<b>A Study of the p-Adic Frobenius Lifts and p-Adic Periods, from a Deformation Theory Viewpoint</b>	
L. M. Ionescu.....	408
<b>Low-Rank Sparse Representation with Pre-Learned Dictionaries and Side Information for Singing Voice Separation</b>	
C. H. Yang, H. J. Zhang.....	419
<b>Martingales and Super-Martingales Relative to a Convex Set of Equivalent Measures</b>	
N. S. Gonchar.....	428

## Advances in Pure Mathematics (APM)

### Journal Information

#### SUBSCRIPTIONS

The *Advances in Pure Mathematics* (Online at Scientific Research Publishing, [www.SciRP.org](http://www.SciRP.org)) is published monthly by Scientific Research Publishing, Inc., USA.

##### **Subscription rates:**

Print: \$79 per issue.

To subscribe, please contact Journals Subscriptions Department, E-mail: [sub@scirp.org](mailto:sub@scirp.org)

#### SERVICES

##### **Advertisements**

Advertisement Sales Department, E-mail: [service@scirp.org](mailto:service@scirp.org)

##### **Reprints (minimum quantity 100 copies)**

Reprints Co-ordinator, Scientific Research Publishing, Inc., USA.

E-mail: [sub@scirp.org](mailto:sub@scirp.org)

#### COPYRIGHT

##### **Copyright and reuse rights for the front matter of the journal:**

Copyright © 2018 by Scientific Research Publishing Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY).

<http://creativecommons.org/licenses/by/4.0/>

##### **Copyright for individual papers of the journal:**

Copyright © 2018 by author(s) and Scientific Research Publishing Inc.

##### **Reuse rights for individual papers:**

Note: At SCIRP authors can choose between CC BY and CC BY-NC. Please consult each paper for its reuse rights.

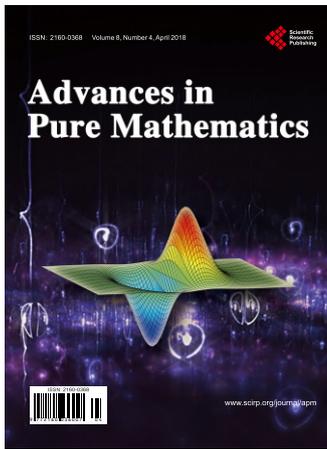
##### **Disclaimer of liability**

Statements and opinions expressed in the articles and communications are those of the individual contributors and not the statements and opinion of Scientific Research Publishing, Inc. We assume no responsibility or liability for any damage or injury to persons or property arising out of the use of any materials, instructions, methods or ideas contained herein. We expressly disclaim any implied warranties of merchantability or fitness for a particular purpose. If expert assistance is required, the services of a competent professional person should be sought.

#### PRODUCTION INFORMATION

For manuscripts that have been accepted for publication, please contact:

E-mail: [apm@scirp.org](mailto:apm@scirp.org)



*Call for Papers*

# Advances in Pure Mathematics (APM)

ISSN 2160-0368 (Print) ISSN 2160-0384 (Online)  
<http://www.scirp.org/journal/apm>

**Advances in Pure Mathematics (APM)** is an international journal dedicated to the latest advancements in ordered algebraic structures. The goal of this journal is to provide a platform for scientists and academicians all over the world to promote, share, and discuss various new issues and developments in different areas of ordered algebraic structures.

## Subject Coverage

This journal invites original research and review papers that address the following issues. Topics of interest include, but are not limited to:

- Applied Harmonic Analysis
- Approximation Theory
- Asymptotic Methods
- Bifurcation Theory
- Coding Theory
- Combinatorics
- Complex Analysis
- Convex Analysis
- Difference Equations
- Differential Equations
- Dynamical Systems
- Fixed-Point Theory
- Fourier Analysis
- Fractals
- Fractional Analysis
- Functional Differential Equations
- Fuzzy Mathematics
- Geometry
- Geometry of Banach Spaces
- Integral Equations
- Mathematical Biology, including Population Dynamics
- Mathematical Physics
- Matrix Theory
- Moment Theory
- Number Theory
- Numerical Analysis
- Operator Theory
- Optimal Control
- Optimization Wavelets
- Partial Differential Equations
- Probability
- Reaction-Diffusion Problems, Discrete Mathematics
- Scattering Theory
- Semigroups of Operators
- Signal Theory
- Special Functions
- Statistics
- Stochastic Process
- Topology and Applications
- Transport Theory
- Ultrametric Analysis
- Variational Methods

We are also interested in short papers (letters) that clearly address a specific problem, and short survey or position papers that sketch the results or problems on a specific topic. Authors of selected short papers would be invited to write a regular paper on the same topic for future issues of the APM.

## Notes for Intending Authors

Submitted papers should not have been previously published nor be currently under consideration for publication elsewhere. Paper submission will be handled electronically through the website. All papers are refereed through a peer review process. For more details about the submissions, please access the website.

## Website and E-Mail

<http://www.scirp.org/journal/apm>      E-mail: [apm@scirp.org](mailto:apm@scirp.org)

