

# World Journal of Mechanics



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

# Journal Editorial Board

ISSN 2160-049X (Print) ISSN 2160-0503 (Online)

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

---

## Editors-in-Chief

**Prof. Dan Mateescu**

McGill University, Canada

**Prof. Kumar K. Tamma**

University of Minnesota, USA

## Editorial Board

**Prof. Ramesh K. Agarwal**

Washington University in St. Louis, USA

**Prof. Nurullah Arslan**

Fatih University, Turkey

**Dr. Tommaso Astarita**

University of Naples, Italy

**Prof. Jan Awrejcewicz**

Lodz University of Technology, Poland

**Prof. Joao Bernardo Lares Moreira de Campos**

The University of Porto, Portugal

**Prof. Ismail Celik**

West Virginia University, USA

**Prof. Jin-Rae Cho**

Hongik University, South Korea

**Prof. Huashu Dou**

Zhejiang Sci-Tech University, China

**Prof. Igor Emri**

California Institute of Technology, USA

**Prof. Victor A. Eremeyev**

Martin Luther University of Halle-Wittenberg, Germany

**Dr. Xiaosheng Gao**

The University of Akron, USA

**Prof. Sachin Goyal**

University of California, USA

**Prof. Nguyen Dang Hung**

University of Liege, Belgium

**Dr. Mohsen Sheikholeslami Kandelousi**

Babol University of Technology, Iran

**Prof. Ilya G. Kaplan**

National Autonomous University of Mexico, Mexico

**Prof. Semih Kucukarslan**

Istanbul Technical University, Turkey

**Prof. Anjan Kundu**

Saha Institute of Nuclear Physics, India

**Prof. Tadeusz Lagoda**

Opole University of Technology, Poland

**Prof. Sanboh Lee**

National Tsing Hua University, Chinese Taipei

**Prof. Xiaodong Li**

University of South Carolina, USA

**Dr. Jianlin Liu**

China University of Petroleum (Huadong), China

**Prof. Giulio Lorenzini**

University of Parma, Italy

**Prof. Antonio Ferreira Miguel**

University of Evora, Portugal

**Dr. Rostand Moutou Pitti**

Blaise Pascal University, France

**Dr. Rafael Pacheco**

Arizona State University, USA

**Prof. Christopher G. Provatidis**

National Technical University of Athens, Greece

**Prof. Mohammad Mehdi Rashidi**

Tongji University, China

**Prof. Haiduke Sarafian**

The Pennsylvania State University, USA

**Prof. Richard Saurel**

Aix Marseille University, France

**Prof. Fulin Shang**

Xi'an Jiaotong University, China

**Prof. David S.-K. Ting**

University of Windsor, Canada

**Prof. Qiang Xue**

Civil and Hydraulic Engineering and Information Technology Research Center, Chinese Taipei

**Prof. Ruey-Jen Yang**

National Cheng Kung University, Chinese Taipei

**Prof. Duyi Ye**

Zhejiang University, China

# Table of Contents

**Volume 7    Number 12**

**December 2017**

## **Topology Optimization and Fatigue Analysis of Temporomandibular Joint Prosthesis**

M. A. Al-Ali, M. A. Al-Ali, A. Takezawa, M. Kitamura.....323

## **Experimental Investigation of Two-Dimensional Velocity on the 90° Double Bend Pipe Flow Using Ultrasound Technique**

S. Shwin, A. Hamdani, H. Takahashi, H. Kikura.....340

## **General Relativistic Orbital Effects in Compact Binary Stars (Solution by the Method of Celestial Mechanics)**

L. S. Li.....360

# World Journal of Mechanics (WJM)

## Journal Information

### SUBSCRIPTIONS

The *World Journal of Mechanics* (Online at Scientific Research Publishing, [www.SciRP.org](http://www.SciRP.org)) is published monthly by Scientific Research Publishing, Inc., USA.

#### Subscription rates:

Print: \$69 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 © 2017 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 © 2017 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

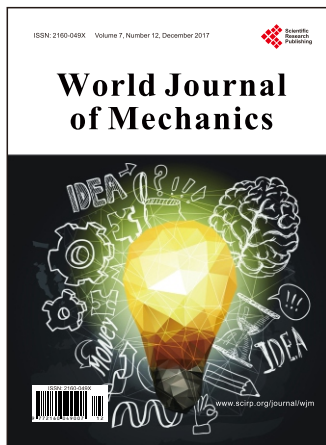
Statements and opinions expressed in the articles and communications are those of the individual contributors and not the statements and opinion of Scientific Research Publishing, Inc. We assume no responsibility or liability for any damage or injury to persons or property arising out of the use of any 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: [wjm@scirp.org](mailto:wjm@scirp.org)





***Call for Papers***

# World Journal of Mechanics (WJM)

ISSN 2160-049X (Print) ISSN 2160-0503 (Online)

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

**World Journal of Mechanics (WJM)** is an international peer-reviewed journal dedicated to presenting the English original research studies, reviews in the general field of mechanics including the mechanics of solids, structures and fluids and their interaction.

## 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 Mathematics and Mechanics
- Biomechanics and Modeling in Mechanobiology
- Celestial Mechanics and Dynamical Astronomy
- Classical and Quantum Aspects of Mechanics
- Computational Mechanics
- Computer Methods in Applied Mechanics and Engineering
- Continuum Mechanics and Thermodynamics
- Damage Mechanics
- Dynamics and Vibration Control
- Elasticity and Plasticity
- Engineering Fracture Mechanics
- Environmental Fluid Mechanics
- Experimental Mechanics
- Fluid Mechanics and Aerodynamics
- Mathematical Fluid Mechanics
- Mathematics and Mechanics of Solids
- Mechanical Behavior of Biomedical Materials
- Mechanical Engineering Science
- Mechanical Systems and Signal Processing
- Mechanics & Astronomy
- Mechanics and Materials in Design
- Mechanics in Medicine and Biology
- Mechanics of Materials
- Mechanics of Time-Dependent Materials
- Microfluidics
- Micromechanics and Microengineering
- Multi-Scale Mechanics
- Nanomechanics
- Non-Linear Mechanics
- Non-Newtonian Fluid Mechanics
- Numerical and Analytical Methods in Geomechanics
- Probabilistic Engineering Mechanics
- Rock Mechanics and Mining Sciences
- Solid and Structural Mechanics
- Statistical Mechanics and Its Applications
- Terramechanics
- Theoretical and Applied Fracture Mechanics
- Thermophysics and Aeromechanics
- Thin Film Mechanics
- Viscoelasticity

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 World Journal of Mechanics.

## 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/wjm>

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

## What is SCIRP?

Scientific Research Publishing (SCIRP) is one of the largest Open Access journal publishers. It is currently publishing more than 200 open access, online, peer-reviewed journals covering a wide range of academic disciplines. SCIRP serves the worldwide academic communities and contributes to the progress and application of science with its publication.

## What is Open Access?

All original research papers published by SCIRP are made freely and permanently accessible online immediately upon publication. To be able to provide open access journals, SCIRP defrays operation costs from authors and subscription charges only for its printed version. Open access publishing allows an immediate, worldwide, barrier-free, open access to the full text of research papers, which is in the best interests of the scientific community.

- High visibility for maximum global exposure with open access publishing model
- Rigorous peer review of research papers
- Prompt faster publication with less cost
- Guaranteed targeted, multidisciplinary audience



**Website: <http://www.scirp.org>**

**Subscription: [sub@scirp.org](mailto:sub@scirp.org)**

**Advertisement: [service@scirp.org](mailto:service@scirp.org)**