

*Challenge Journal of*

# STRUCTURAL MECHANICS

Vol.10 No.2 (2024)

auxetic    buckling load    building codes  
compressive strength    dynamic analysis  
earthquake    finite element method  
girder bridge    Jaya algorithm    metaheuristic  
algorithms    modal analysis    optimization  
prestressing    pushover analysis    reinforced  
concrete    seismic design    shallow foundations  
smart concrete    stability    static analysis  
steel structures    structural dynamics  
temperature effects    thick plate    wind



**TULPAR**  
ACADEMIC PUBLISHING

ISSN 2149-8024



# Challenge Journal

## OF STRUCTURAL MECHANICS

### EDITOR-IN-CHIEF

Assoc. Prof. Dr. Fatih Mehmet ÖZKAL  
Atatürk University, Türkiye

### CO-EDITOR-IN-CHIEF

Prof. Dr. Serdar ÇARBAŞ  
Karamanoğlu Mehmetbey University, Türkiye

### EDITORIAL BOARD

Prof. Dr. Naida ADEMOVIĆ	<i>University of Sarajevo, Bosnia and Herzegovina</i>
Prof. Dr. M. Asghar BHATTI	<i>University of Iowa, United States</i>
Prof. Dr. Alper BÜYÜKKARAGÖZ	<i>Gazi University, Türkiye</i>
Prof. Dr. Marco CORRADI	<i>University of Huddersfield, United Kingdom</i>
Prof. Dr. Adem DOĞANGÜN	<i>Uludağ University, Türkiye</i>
Prof. Dr. Oğuz Akın DÜZGÜN	<i>Atatürk University, Türkiye</i>
Prof. Dr. Gilbert Rainer GILLICH	<i>Eftimie Murgu University of Resita, Romania</i>
Prof. Dr. Taha IBRAHIM	<i>Benha University, Egypt</i>
Prof. Dr. Reza KIANOUSH	<i>Ryerson University, Canada</i>
Prof. Dr. Long-Yuan LI	<i>University of Plymouth, United Kingdom</i>
Prof. Dr. Paulo B. LOURENÇO	<i>University of Minho, Portugal</i>
Prof. Dr. Željana NIKOLIĆ	<i>University of Split, Croatia</i>
Prof. Dr. Togay ÖZBAKKALOĞLU	<i>Texas State University, United States</i>
Prof. Dr. Mehmet ÖZYAZICIOĞLU	<i>Atatürk University, Türkiye</i>
Prof. Dr. Filiz PİROĞLU	<i>İstanbul Technical University, Türkiye</i>
Prof. Dr. Bing QU	<i>California Polytechnic State University, United States</i>
Prof. Dr. A. Ghani RAZAQPUR	<i>McMaster University, Canada</i>
Prof. Dr. Anna SAETTA	<i>IUAV University of Venice, Italy</i>
Prof. Dr. Halil SEZEN	<i>The Ohio State University, United States</i>
Prof. Dr. Hélio Luiz SIMONETTI	<i>Federal Institute of Minas Gerais, Brazil</i>
Prof. Dr. Y. Cengiz TOKLU	<i>Beykent University, Türkiye</i>

Prof. Dr. Habib UYSAL	<i>Atatürk University, Türkiye</i>
Assoc. Prof. Dr. Alberto Maria AVOSSA	<i>Second University of Naples, Italy</i>
Assoc. Prof. Dr. Sandro CARBONARI	<i>Marche Polytechnic University, Italy</i>
Assoc. Prof. Dr. Panatchai CHETCHOTISAK	<i>Rajamangala University of Technology Isan, Thailand</i>
Assoc. Prof. Dr. Burak Kaan ÇIRPICI	<i>Erzurum Technical University, Türkiye</i>
Assoc. Prof. Dr. Amin GHANNADIASL	<i>University of Mohaghegh Ardabili, Iran</i>
Assoc. Prof. Dr. Luca LANDI	<i>University of Bologna, Italy</i>
Assoc. Prof. Dr. Fabio MAZZA	<i>University of Calabria, Italy</i>
Assoc. Prof. Dr. Hong SHEN	<i>Shanghai Jiao Tong University, China</i>
Assoc. Prof. Dr. Nunziante VALOROSO	<i>Parthenope University of Naples, Italy</i>
Assoc. Prof. Dr. Teng WU	<i>University at Buffalo, United States</i>
Dr. Pierfrancesco CACCIOLA	<i>University of Brighton, United Kingdom</i>
Dr. Chien-Kuo CHIU	<i>National Taiwan University of Science and Technology, Taiwan</i>
Dr. Susanta GHOSH	<i>Michigan Technological University, United States</i>
Dr. J. Michael GRAYSON	<i>The Citadel - The Military College of South Carolina, United States</i>
Dr. Ehsan HARIRCHIAN	<i>Bauhaus-Universität Weimar, Germany</i>
Dr. Süleyman Nazif ORHAN	<i>Erzurum Technical University, Türkiye</i>
Dr. Zühal ÖZDEMİR	<i>The University of Sheffield, United Kingdom</i>
Dr. Chitaranjan PANY	<i>Vikram Sarabhai Space Centre, India</i>
Dr. José SANTOS	<i>University of Madeira, Portugal</i>
Dr. Syahril TAUFİK	<i>Lambung Mangkurat University, Indonesia</i>
Dr. Casim YAZICI	<i>Ağrı İbrahim Çeçen University, Türkiye</i>

**E-mail:** [cjsmec@challengejournal.com](mailto:cjsmec@challengejournal.com)

**Web page:** [cjsmec.challengejournal.com](http://cjsmec.challengejournal.com)

**Tulpar Academic Publishing**  
[www.tulparpublishing.com](http://www.tulparpublishing.com)





## CONTENTS

---

---

### *Research Articles*

---

**Ultimate drift ratio prediction of steel plate shear wall systems: a machine learning approach** 34–46

*Muhammed Gürbüz, İlker Kazaz*

---

**The novelty design method in lightweight structures with low effective elastic modulus** 47–57

*Hojjat Ghahramanzadeh Asl, Derya Karaman*

---

**Effect of different trimline extension of clear aligners in combination with Class II elastics on the mandibular dentition: a finite element analysis** 58–68

*Nurver Karşlı, Bahanur Hilal Kisbet*

---

**From ruins to reconstruction: Harnessing text-to-image AI for restoring historical architectures** 69–85

*Kawsar Arzomand, Michael Rustell, Tatiana Kalganova*

---

---

