

# **Booklet of Abstracts**

## **“1<sup>st</sup> International Conference on Mathematical Modelling in Mechanics and Engineering”**

**Mathematical Institute of the Serbian Academy of Sciences and Arts  
Belgrade, 08.-10. September 2022.**

**Editors: Ivana Atanasovska, Milan Cajić, Danilo Karličić**

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## PREFACE

It's our pleasure to be the chairs of the '1st International Conference on Mathematical Modelling in Mechanics and Engineering', organized by the Mathematical Institute of the Serbian Academy of Sciences and Arts, and co-organized by the Faculty of Mechanical Engineering, University of Belgrade; the Faculty of Mechanical and Civil Engineering in Kraljevo, University of Kragujevac; and Institute for Information Technologies, University of Kragujevac. The conference will be held in hybrid form at the Mathematical Institute of the Serbian Academy of Sciences and Arts, Belgrade, Serbia, from 8<sup>th</sup> to 10<sup>th</sup> of September, 2022.

This conference is planned as the first event in the series of conferences which will be held every two or three years and bring together leading academic scientists, researchers and research scholars to exchange and share experience and research results on various aspects of mathematical modelling in mechanics and engineering. It will bring an interdisciplinary platform for researchers, practitioners and educators to present and discuss the most recent innovations, theories, algorithms, as well as practical challenges encountered and solutions adopted in the fields of Classical Mechanics, Solid and Fluid Mechanics, Computational Mechanics, Biomechanics, Applied Mathematics and Physics, Structural Mechanics and Engineering. A considerable number of prominent scientists and professors submitted their abstracts and confirmed their attendance at the conference. The scientists and researchers from different countries in Europe and the world (Netherlands, UK, Norway, Greece, Spain, USA, Kazakhstan, Italy, Montenegro, India, Malaysia, Slovenia etc.) also have confirmed participation at the conference. We expect that the conference presentations will cover modelling with analytical/numerical and data driven solutions to study complex media, composite aerospace and periodic structures and metamaterials, and capture essential features of linear and nonlinear dynamics and wave propagation behaviour that can lead to new designs of such systems. Some presentations will include new experimental setups to study engineering materials and novel control strategies based on classical or fractional derivative models used to control the dynamics of multibody, flexible and/or electromechanical systems. Finally, we believe that the sessions' discussions will have high potential to give significant contribution to the developments of new and advanced mathematical models of real-world engineering mechanical systems.

We're very proud to announced that the number of accepted contributions to be presented at this Conference is 106, with 7 plenary and 4 invited lecture presentations. We would like to express our gratitude to the institutions that support conference financially: The Ministry of education, science and technological development of the Republic of Serbia; METALFER STEEL MILL doo, Serbia; and SHIMADZU, Serbia. We are especially grateful to the members of the Scientific committee and participants who gave their contribution to this international scientific meeting with their advices and abstracts' reviews. We also thank to the support of the co-organizers of this Conference: The Faculty of Mechanical Engineering, University of Belgrade, Serbia; The Faculty of Mechanical and Civil Engineering in Kraljevo, University of Kragujevac, Serbia; and Institute for Information Technologies, University of Kragujevac, Serbia.

We hope that this conference will be success beginning of a recognized series of international conference events during next decades. We use the opportunity to wish to all participants a successful presentation of their scientific results.

Cordially,

Ivana Atanasovska, Conference Chair  
Milan Cajić, Conference Vice-Chair  
Danilo Karličić, Conference Vice-Chair



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## NUMERICAL SIMULATION OF COLUMN BASE PLATE BEHAVIOR

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**Keywords:** column base plates, finite element analysis, rotational stiffness, moment capacity, steel structures.

### ABSTRACT

Base plates are the structural components responsible for transferring loads from the structure to the foundation [1]. They have a significant influence on the stability and stiffness of steel structures. This kind of connection has a complex nature due to the different behaviors of the components, including the base plate, grout, anchor bolts, and foundation. The main goal of this work is to investigate the rotational behavior [2] of column base plate connections. First, a nonlinear three-dimensional finite element model (Figure 1) was created for this connection using the CAST3M software [3]. The model was subjected to a constant axial load, and then a monotonic moment loading was applied. The model response is validated and calibrated with an existing experimental test. Next, this model evaluates the effects of some of the essential components of column base connections, such as anchor bolts, base plates, and stiffeners [4].

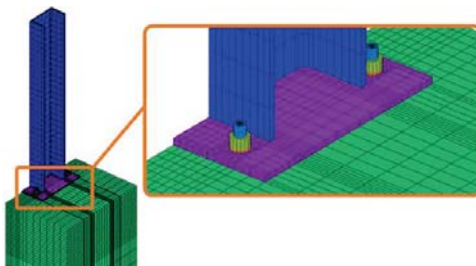


Figure 2 Meshing of column base plates

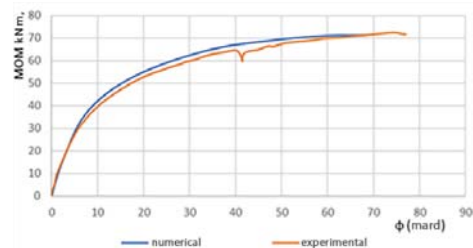


Figure 3 Comparison between the experimental and numerical (FEA) result

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