



PROCEEDINGS

**The 6th International Congress of
Serbian Society of Mechanics
Tara, June 19-21, 2017**

Edited by:

**Mihailo P. Lazarević
Damir Madjarević
Ines Grozdanović
Nemanja Zorić
Aleksandar Tomović**

Proceedings

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Foreward

The present volume contains plenary lectures, abstracts and papers of young authors competing for the „Rastko Stojanović” award at the 6th International Congress of Serbian Society of Mechanics. The objectives of this Congress, to be held at Mountain Tara during the period 19th -21th June 2017, are to review and discuss some of the latest trends in various fields of theoretical and applied mechanics as well as it aims to bring together the scientific communities of theoretical and applied mechanics in an effort to facilitate the exchange of ideas on topics of mutual interests, and to serve as a platform for establishing links between research groups with complementary activities.

We are happy to report that the number of accepted papers to be presented at the 6th Congress is 99. In addition, among them, 7 invited plenary lectures were presented by the authors from Russia, USA, Greece, Germany, Serbia and BIH, Republika Srpska. These papers were grouped in the following sections General Mechanics, Fluid Mechanics, Mechanics of Solid Bodies, Control and Robotics, and Interdisciplinary and Multidisciplinary Areas. Also, the three Minisymposia were organized with following topics: Nonlinear Dynamics, Turbulence and Bioengineering.

The Editors would like to express their thanks to all participants for their scientific contribution to 6th Congress of Mechanics, as well as colleagues and friends who helped with the organization. Next, to the distinguished invited lecturers who kindly accepted the invitation to come to Congress and helped make it success. We owe great thanks to the reviewers of the papers, to the members of the Scientific and Organizing Committee, and to the organizers of the Mini-symposia on Nonlinear Dynamics, Turbulence and Bioengineering. The support of the members of Steering Committee of Serbian Society of Mechanics in organizing this event is also appreciated. Finally, special thanks are also due to those organizations which supported financially this Congress: Serbian Society of Mechanics, Ministry of Education, Science and Technological Development of the Republic of Serbia, and Faculty of Mechanical Engineering, University of Belgrade, Belgrade. It is our great pleasure to have you with us at the 6th Congress International Congress of Serbian Society of Mechanics.

We would like to wish all participants of this Congress a warm welcome to our country, our Serbian Society of Mechanics and Venue Congress place at Hotel Omorika, Tara, Serbia.

Tara, June, 2017

The Editors

Mihailo P. Lazarević

Damir Madjarević

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G2e: Aleksandar S. Okuka, Miodrag M. Žigić, Nenad M. Grahovac
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A NOTE ON DAMAGE-FRAGMENTATION TRANSITION OF SLENDER
TAYLOR PROJECTILES: SIZE EFFECT AND SCALING BEHAVIOR

G3f: Antonio Rinaldi, Sreten Mastilović
A REMINDER OF THE KRAJCIHOVIC APPROACH TO SCALING OF QUASI-
BRITTLE FRACTURE

Mechanics of Solid Bodies (S)

S1 *Chair: Ratko Pavlović*
 Co-Chair: Dušan Zorica

S1a: Dušan Zorica, Teodor M. Atanacković, Zora Vrcelj, Branislava Novaković
NON-LOCAL AXIALLY LOADED ROD PLACED ON VISCOELASTIC AND
PASTERNAK TYPE FOUNDATION: DYNAMIC STABILITY ANALYSIS

equilibrium methods underestimate the position of the critical sliding surface. In order to increase the reliability of limit equilibrium methods, author propose two different models.

G3d: Bojan Medjo, Marko Rakin, Nenad Gubeljak, Walid Musraty, Andrej Likeb, Ivana Cvijović-Alagić, Aleksandar Sedmak

FRACTURE MECHANICS ANALYSIS OF HETEROGENEOUS CYLINDRICAL STRUCTURES USING PIPE-RING NOTCHED BEND SPECIMENS

Fracture resistance of cylindrical structures, such as pipes, elbows or small-diameter vessels is typically difficult to assess using the standard-shaped specimens (e.g. those defined by the standard ASTM E1820). Therefore, a new specimen type is proposed recently for testing the fracture mechanics properties of cylindrical geometries with defect in axial direction - PRNB or Pipe ring notched bend specimen. This work deals with application of the PRNB specimen to thin-walled seam pipes with an initial defect in the seam or in the base metal. Also, determination of micromechanical parameters for fracture prediction using local approach is considered.

G3e: Sreten Mastilović

A NOTE ON DAMAGE-FRAGMENTATION TRANSITION OF SLENDER TAYLOR PROJECTILES: SIZE EFFECT AND SCALING BEHAVIOR

This investigation is aimed at scaling behavior of a transition region from the damaged to the fragmented phase in impact-induced breakup of a slender projectile. The input data are provided by molecular dynamics simulations of the ballistic Taylor test performed with a simple generic model to explore an extended low-energy range. Flat-ended, monocrystalline, nanoscale projectiles, with a fixed aspect ratio but ten different diameters, impact a rigid target under the right angle. With gradually increasing striking velocity, a substantial projectile disintegration eventually takes place and is identified with the damage-fragmentation phase transition. The atomistic simulations enable a detailed insight into the neighborhood of the damage-fragmentation transition and the fragmentation onset at the critical point. The transition onset is determined to be dependent upon the striking velocity. A finite size scaling analysis of the average fragment mass is carried out to determine critical exponents and dependence of the critical striking velocity upon the slender projectile's diameter.

G3f: Antonio Rinaldi, Sreten Mastilović

A REMINDER OF THE KRAJCINOVIC APPROACH TO SCALING OF QUASI-BRITTLE FRACTURE

Damage, strain localization, and fracture of quasi-brittle solids are not always prone to interpretation in the continuum mechanics framework. The quasi-brittle fracture is characterized by progressive accumulation of damage, at first mainly in the form of uniformly nucleated microcracks that, eventually, coalesce into a distinct macrocrack that propagates without warning by the end of the failure process. One of the most formidable problems in the continuum formulation of fractures of this kind is the localized damage, which causes a scale effect more complex than the scaling encountered in traditional plasticity and fracture mechanics. In addition to laboratory experiments, the recent research

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**МИНИСТАРСТВО ПРОСВЕТЕ,
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