



EDITOR-IN-CHIEF'S WORD

Dear Readers,

Being true to our promise, we proudly present you another new issue of our Academy's Bulletin in English – „*Engineering Power*“ Vol. 13(1) 2018. Guest-Editor of this issue is Igor Karšaj, a successful young scientist and expert, Associate of the Academy in the Department of Mechanical Engineering and Naval Architecture.

The Croatian Academy of Engineering especially encourages its younger members, immediately after their admission to membership of the Academy, to participate in all Academy's activities in which they may excel themselves and present their scientific and expert knowledge and skills. In this way, the Academy further stimulates their domestic and international renown through the presentation of their projects and achievements and grants them access to new opportunities for co-operation with distinguished international associations of engineering academies.

Editor-in-Chief

Vladimir Androćec, President of the Croatian Academy of Engineering



EDITOR'S WORD

In the second subsequent issue of „*Engineering Power*“, presenting a part of multidisciplinary research activities at the University of Zagreb, based on synthesizing of technological and biotechnological sciences, the Academy continues with its introduction of the research teams at the Faculty of Mechanical Engineering and Naval Architecture of Zagreb. The Guest-Editor of this issue is Igor Karšaj, PhD, Associate Professor at the Faculty of Mechanical Engineering and Naval Architecture and Associate Member of the Croatian Academy of Engineering in the Department

of Mechanical Engineering and Naval Architecture.

Editor

Zdravko Terze, Vice-President of the Croatian Academy of Engineering



FOREWORD

This issue is dedicated to the scientific work in the field of biomechanical engineering in the Laboratory for Numerical Mechanics at the Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb. Our work concerns modeling of soft tissue behavior, particularly abdominal aortic aneurysms (AAAs) development.

We addressed the problem of intraluminal thrombus enlargement within abdominal aortic aneurysm. Our main goal was to develop a theoretical and computational biochemomechanical model of evolving properties of ILT incorporated into an initially healthy artery. We showed that thrombus-laden lesions can either arrest or rupture depending on the biochemical (e.g., concentration of elastases) and biomechanical (stiffness of fibrin) properties of the ILT. These computational results suggest that ILT should be accounted for when predicting a potential enlargement or rupture risk of AAAs and highlight some specific needs for further experimental and computational research. The scientific work within our group concerned the very first growth and remodeling model that addresses together the mechanobiology, biochemistry, and biomechanics of thrombus-laden AAAs.

The herein presented results are the result of fruitful cooperation with Jay D Humphrey's group from Yale University, USA, Gerhard Holzapfel's group from TU Graz, Austria, Seungik Baek from Michigan State University, USA and Ivo Lovrićević, Medical School, University of Zagreb. The scientific work in our group was supported by grants from the Croatian Science Foundation project IP-2014-09-7382 and Installation Grant to I. Karšaj.

Guest-Editor

Igor Karšaj, University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture