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COMPUTATIONAL VASCULAR BIOMECHANICS

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T.CHRISTIAN GASSER[1], MICHAEL W. GEE[2], THOMAS FRANZ[3] AND DANIELA VALDEZ-JASSO[4]

[1] Department of Solid Mechanics, KTH Royal Institute of Technology, Stockholm Sweden, gasser@kth.se.
[2] Munich School of Engineering (MSE) & Mechanical Engineering Faculty, Technische Universität, München, Germany, gee@lnm.mw.tum.de.
[3] Department of Human Biology, University of Cape Town, South Africa, thomas.franz@uct.ac.za
[4] Bioengineering, University of California at San Diego, US, dvaldezjasso@ucsd.edu

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ABSTRACT

Computational vascular mechanics plays prominent roles in the study of biological systems and processes. It may advance our understanding of physiological and pathological mechanisms of organs, interaction between medical devices and biological material, drug delivery pathways, the interplay between structure and function of tissues, mechanotransduction and many others. Although to some extent traditional applied mechanics concepts are directly applicable to solve biomechanical problems, the inherent property of vascular tissue to adapt to mechanical and biochemical environments, remains a challenging modeling task. The adequate investigation of the vasculature requres sophisticated and robust numerical schemes to be coupled among structural, fluid, chemical and other fields. On the other hand, the inter-patient variability of input parameters such as loading conditions or constitutive properties weakens the patient-specific predictability, and hence the clinical benefit, of numerical simulations.

For this minisymposium, we solicit contributions that address challenges directly related to vascular bioengineering, i.e., solving structural, hemodynamical, chemical and other life science problems. This includes investigations at the organ, tissue and cellular levels. Contributions that consider

- novel numerical concepts
- coupled and multiscale analyses
- novel constitutive models that account for non-linearities and/or multiscale approaches
- applications with potential clinical relevance
- physiological and pathological mechanisms
- Uncertainty and sensitivity analyses
- active/growth/remodeling properties of biological tissues
- non-linear rheological models
- clotting and thrombus formation modeling
- inverse and in-vivo parameter estimation
- medical image-based studies

are particularly welcome.