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COMPUTATIONAL MECHANICS OF BIOLOGICAL AND BIO-INSPIRED MATERIALS AND STUCTURES

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ABSTRACT

There are (at least) two reasons for that Engineering Science has a strong affinity to the mechanics of biomaterials and structures: First, it is intriguing to learn how nature has solved complex structural problems, in order to transfer the basic ideas of these solutions to man-made structures. The well-known and popular fields dealing with this transfer are called bionics and biomimetics. Mimicking nature also often helps to improve material design as one foundation for designing better structures in terms of efficacy, reliability, but also esthetics. Secondly, the theoretical and computational methods of Civil (and Mechanical) Engineering Mechanics to describe and characterize manmade materials can be used to reveal the structure-function relationships of biological materials. As compared to bionics, this approach is rather new, but has already changed the vision of how biological materials work, and, hence, proven its great potential. In particular, it helps to considerably improve techniques for diagnosis and therapy of various diseases.

Along these lines, the symposium will explore latest contributions in the computational mechanics field. From a methodological viewpoint, they will reach from poro-micromechanical approaches to molecular and atomistic simulations, as well as multiscale approaches encompassing all scales from nanometer to meter. From a practical viewpoint, they will encompass natural tissue (bone, wood, soft tissues) and bio-inspired man-made materials (such as tissue engineering scaffolds).