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EXASCALE ALGORITHMS AND SOFTWARE TECHNIQUES FOR COMPUTATIONAL FLUID AND SOLID MECHANICS

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ABSTRACT

The aim of this minisymposium is to discuss and to share ideas about special numerical techniques and computational algorithms for the efficient treatment of partial differential equations (PDEs) that arise in the simulation of problems from computational fluid dynamics (CFD) as well as computational solid mechanics (CSM). The presented approaches shall address the challenges w.r.t. future high performance computing environments which will be in the petascale and even exascale range and which will include massively parallel, heterogeneous architectures together with specific accelerator hardware (GPUs, FPGAs). The minisymposium will specifically concentrate on methods and their foundations, such as advanced discretization techniques and efficient parallel solution algorithms. The minisymposium will highlight the interplay of these aspects with computational and algorithmic tools and their realization in software. We shall discuss, for instance, aspects from hardware-oriented numerics including energy efficiency [1,2], numerical cloud computing, and massively parallel asynchronous solvers [3, 4]. Other aspects to be discussed are nonlinear domain decomposition methods [5] and extremely scalable numerical homogenization methods [6].

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