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HIGH PERFORMANCE COMPUTATIONAL MECHANICS

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ABSTRACT

The development of more powerful and energy efficient computer architectures is widening the use of large-scale high performance computing techniques. Important increases in computational power are being achieved by many core systems with powerful accelerators such as general-purpose graphics processing units (GP-GPUs). These systems also include more complex hierarchical cache/memory designs which permit to provide the needed data flow required by computing units. These new hardware designs pose a challenge for the implementation and scalability of current simulation algorithms and, at the same time, offer the opportunity for the development of new ones. In this framework the proposed mini-symposium aims to discuss algorithmic aspects of large scale computing. The topics include new developments in: parallel mesh generation; dynamic load balance; vectorization; MPI+X hybrid parallelization; repartitioning; domain decomposition; multigrid and sparse direct methods; visualization of large data sets, etc. These topics will be considered in terms of theoretical aspects, practical implementation and scalability studies. Tailored algorithms for different fields of applications will be considered: fluid and solid mechanics; chemistry; physics; electromagnetism, etc.