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ADVANCED HPC ALGORITHMS FOR LARGE-SCALE SIMULATIONS TRACK 5000

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ABSTRACT

The evolution in hardware technologies enables scientific computing to reach further aims. Nowadays, the use of hybrid high-performance computing (HPC) systems is rather common on the solution of both industrial and academic scale problems. However, many algorithms employed in scientific computing have a very low arithmetic intensity, which is the ratio of computing work in floating-point operations to memory traffic in bytes, hence numerical simulation codes are usually memory-bounded, making processors suffer from serious data starvation [1].To take advantage of such systems, the computing subroutines that form the algorithms, the so-called kernels, must be compatible with distributed- and shared-memory multiple instruction, multiple data parallelism, and more importantly, with stream processing, which is a very restrictive parallel programming paradigm [2]. Therefore, complex hierarchical parallel implementations are required for combining the different parallel paradigms and the corresponding computing frameworks [3]. In this context, the objective of this Minisymposium is to bring together people working on advanced, cutting-edge numerical methods for solving large-scale simulations with a special focus on the efficiency, portability and sustainability. Works on parallel linear solvers, sparse algebra kernels, eigenvalue problems, load balancing, adaptive mesh refinement, domain-specific languages, parallel-in-time methods, among others, are welcomed.

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