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HIGH PERFORMANCE COMPUTING AND RELATED TOPICS

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ABSTRACT

Large-scale problems with growing computational demands continuously arise in several fields of study, for example environmental problems, earthquake simulations, artificial structres and many others. Parallel computing is outstanding among the new computational tools, especially at present when further increases in hardware speed have reached apparently insurmountable barriers. For many problems, parallel computing is the only practical solving means for effectively treating them. During the last twenty years or so, the emergence of parallel computers prompted on the part of the computational modeling community a continual and systematic effort for harnessing it with the purpose of predicting the behavior of many systems. Very early after such an effort began, it was recognized that domain decomposition methods (DDM) are very effective techniques for applying parallelism to the solution of partial differential equations, since such approaches drastically simplify the coordination of the many processing units (CPUs or GPGPUs) that carry out the different tasks and also reduces very much the requirements of communication between them. The current trends of multi-core processors, interconnection technologies, and software development have fueled rapid growth in parallel and distributed computing. However, this development is of practical benefit only if it is accompanied by progress in the design, analysis and application aspects of parallel algorithms. Currently there exist many numerical libraries based on MPI, OpenMP and CUDA, which boost the constructions of software to tackle very complicated problems in commodity computers and also allow us to execute large-scale simulations on supercomputers architectures. The main purpose of this mini symposium is to bring together researchers from several fields, with knowledge or interest in applying efficient domain decomposition methods and high-performance technologies for solving computational mechanics problems.