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HPC METHODS FOR LINEAR SYSTEM AND EIGENPROBLEMS IN LARGE SCALE APPLICATIONS 1400

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ABSTRACT

The demand for accurate and reliable numerical simulations of complex phenomena is increasing exponentially across a broad range of scientific and engineering applications. Problems like modeling fractal formation in macroscopic elasto-plasticity, simulation of biological systems, flow and transport in fractured formations are extremely challenging and require specific knowledge to address them. However, despite of the differences, there is always the need to discretize the underlying partial differential equations (PDEs) to approximate the continuous problems in an algebraic system of equations whose solution or eigen-solution is obtained numerically. In large scale simulations, the solution of linear systems or eigenproblems is often by far the most time-consuming part of the entire process, taking up 80% $\div$ 90% of the total computational time. To address the request for larger simulations, involving billions of unknowns, the development of novel, technology aware, algorithms able to exploit modern HPC systems is of paramount importance [1, 2]. The focus of this minisymposium is exploring the most recent methodologies available for solving sparse linear algebra problems on massively parallel platforms providing researchers as well as practitioners a survey of the potentiality of HPC in real world applications.

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