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Adaptivity Concepts and Load Balancing Strategies for a Generalized Parallel Multigrid/Domain Decomposition Solver

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Abstract: While processor technology is still dramatically advancing and promises further enormous improvements in ‘processing data’ for the next decade, much lower advances in ‘moving data’ are expected such that the efficiency of many sequential and parallel simulation tools for partial differential equations (PDE’s) are restricted by the cost for memory access. We demonstrate how ‘data locality’ and ‘pipelining’ can achieve a significant percentage of the available huge computing power on single processors, and we describe corresponding hardware-oriented concepts for the parallel treatment of ‘adaptive grid refinement’ and ‘adaptive error control’ in combination with special multigrid/domain decomposition schemes. We present their numerical and computational characteristics and discuss corresponding dynamic a posteriori load balancing strategies.

Type of contribution: Talk

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