19. Symposium Simulationstechnik – ASIM 2006

Proposal for a Special Session on "Implementational Aspects in Scientific Computing"

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Scientific Computing is a discipline where computing power is a critical issue in almost every application. More complex models containing more degrees of freedom not only require more available space in memory, but also demand faster and faster machines to compute solutions to these models within an acceptable time frame.

The recent trends in hardware development have added additional challenges to this scenario, because today's codes no longer guarantee to exploit the performance of next-generation hardware to a satisfying degree:

- The so-called *memory wall*, i. e. the increasing performance gap between memory access and processor speed, forces scientific computing software to deal with the efficient use of hierarchies of cache memory.
- Multicore, hyperthreading, and similar keywords reflect the current trend towards having more than one processor core on a single CPU. However, only simulation codes that allow for such fine-level parallelism will be able to get their share of the theoretical performance gain.
- Parallel computers are often no longer vector computers only, or multiprocessor computers only, but more likely of a hybrid architecture, which again poses additional demands to the programmer.

In this workshop, we would like to discuss new approaches and innovative ideas that address these programming challenges. This includes, for example

- new algorithmic approaches that might inherently lead to an improved performance on modern hardware;
- techniques and methods to implement existing algorithms in a way to improve cache performance, low-level parallelism, etc.;
- libraries and tools to help the researcher and/or programmer to improve the performance of a given code;

or similar research that focuses on these impementational aspects in scientific computing software.