Technische Universität Braunschweig

MUSEN

Towards the direct numerical simulation of complex flows at the extreme Scale

Lecture of
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Abstract:
The dynamics of many complex flows is often characterized by several phases that are interacting on a microscopic scale. Examples are bubbly flows or flows with a suspended solid phase. Modern supercomputers enable fully resolved simulations where e.g. each solid particle is represented with its individual geometric shape and where its dynamics is computed with fluid-structure interaction methods.
However, modeling larger ensembles with this kind of direct numerical simulation requires enormous compute power because extreme resolutions become necessary.
To reach this, the parallel scalability of the algorithms is one necessary prerequisite.
Furthermore, a co-design of the models, algorithms, and data structures is needed to exploit the complex hierarchical structure of modern supercomputers.
The talk will discuss current and future trends for the direct simulation of multiphase flows.