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Titel des Beitrags:
An interactive thermal fluid simulator for the design of HVAC systems

Abstract:
This paper describes the current state in the development of a computational steering environment (CSE) for indoor air-flow simulation. The system is especially designed to provide an interactive evaluation of thermal comfort. It consists of an integrated, VR-based visualization client, a parallel computational fluid dynamics (CFD) kernel and a 3D grid generator component. The CSE is intended to support engineers with an easy-to-use tool for designing HVAC systems (heating, ventilating and air conditioning), for example, in the early stages of a project. By utilizing high-performance computing, the tool enables the investigation of indoor air-flow scenarios approaching closely to "real-time". The user interface for visualizing simulation results and the "steering" of the simulator have been combined to form a single application front-end. This allows an intuitive access for steering the simulation, changing the set-up of geometry and boundary conditions and subsequently exploring the results. The simulation kernel is based on a hybrid lattice Boltzmann method with extensions for large-eddy simulations of turbulent convective flows. The next steps in the project are to improve the VR client, enhance the treatment of boundary conditions in the computational kernel and extend the simulator in conjunction with partners in order to integrate a local thermal comfort model.

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