TECHNISCHE UNIVERSITÄT DRESDEN

Institut für Strömungsmechanik, Professur für Strömungsmechanik

Vortrag

Immersed Boundary Conditions Method in Fluid Mechanics

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Many flow systems involve complex and, perhaps, time-dependent geometries. Fluid flows in such systems can be simulated numerically at a considerable cost. The available approaches include Eulerian, Lagrangian and mixed methods. The Eulerian methods, which are of interest to us, can be implemented using either fixed or moving/dynamically adjusted grids. In the case of moving/dynamically adjusted grids the major effort is associated with numerical coordinate generation. In the case of fixed grids, the major problem is associated with the correct representation of geometry of the flow system which does not need to conform to the grid lines. The available approaches for reconstruction of the boundary include MAC, VOF, Level-Set and Immersed Boundaries methods. The first three approaches are characterized by low accuracy and lack of ability for global definition of the flow geometry. The last approach, if designed properly, can provide spectral accuracy as well as sharp resolution of the boundaries of the flow domain. The characteristic feature of this approach is the determination of the solution in a computational domain that is larger than the flow domain, i.e., the flow domain is submerged inside the computational domain. The user must provide special procedures for enforcement of the flow boundary conditions inside the computational domain, address the issue of computational boundary conditions to be imposed at the edges of the computational domain as well as consider possible challenges associated with the character of the solution in the non-physical part of the computational domain. The spectrally-accurate version of this approach, which does not rely on any fictitious forces and thus does not alter the physics of the flow, will be discussed.

Termin: **Donnerstag, 23. April 2009, 17:00 Uhr**
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