Zentrum für Hochleistungsrechnen

I n v i t a t i o n

for

Z H R - K o l l o q u i u m

Titel: **Overlapping Mesh Technique for Compressible/Viscous Flows**

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Abstract:

Simulation of flows in complex geometries remains one of the major research areas in Computational Fluid Dynamics. Introduction of overlapping meshes (instead of using a single global grid) provides considerable flexibility in grid generation allowing one to tackle flows with moving boundaries. The overlapping mesh technique (known also as Chimera Approach) is used here together with the implicit Riemann finite-volume solver for compressible flows and with finite-difference, fourth-order compact schemes for incompressible viscous flows. In the

overlapping mesh technique the physical domain is covered by the union of overlapping subdomains, each with its own local grid. The compressible Euler or incompressible Navier-Stokes equations are solved separately on each subdomain, while the global solution is obtained by iteratively adjusting the boundary conditions on each subdomain. The subdomains can be of almost arbitrary relative position and shape, in particular we allow for nonmatching grids and multiple overlaps. The present work differs from previous approaches in that blending functions are introduced to deal with multiple overlaps of subdomains. The parallelism is exploited here by assigning each subdomain (or a group of subdomains) to a separate processing unit. The field calculations are performed in parallel, while the interprocessor communication is limited only to exchange of boundary information.

The results of computations show that this algorithm is effective when dealing with flows in complicated geometries even for cases with strong discontinuities (shockwaves). In the laminar viscous cases it was shown that the algorithm strictly preserves the fourth-order accuracy of the local solver. The advantage of parallelism is demonstrated using the PVM paradigm for the CRAY 8-processor mainframe and for the cluster of workstations.

Location:	**Willers-Bau, C 307**
Time:	**Thursday, May the 28th in 1998, 3.00 p.m.**

gez. Prof. Dr. W.E. Nagel
