

Parallel Performance of Chimera Overlapping Mesh Techniques for Compressible Flows

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Abstract

The paper presents parallelization of a blended-function-based overlapping mesh technique and its implementation in the case of inviscid compressible flows around complex geometries.

The overlapping grid technique is based on the partition of the domain into overlapping subdomain. The solution in each subdomain is obtained by an implicit algorithm and a characteristics-based method, while the blended functions are implemented in order to allow the accurate interpolation of the boundary conditions in the case of multiple overlaps. The above are applied to flows around multi-element airfoil geometries and results from parallel computations on Cray Server CS6400 and Cray T3E computing platforms are presented.

The load-balancing and parallel performance issues are investigated for several grid systems. A simple model has also been developed for describing the parallel efficiency of the simulations and it is shown that the model results agree well with the parallel experiments.