Abstracts of Papers to Appear in Future Issues

UPWIND RELAXATION METHODS FOR THE NAVIER–STOKES EQUATIONS USING INNER ITERATIONS. Arthur C. Taylor III, *Department of Mechanical Engineering and Mechanics, Old Dominion University, Norfolk, Virginia 23529-0247, USA*; Wing-fai Ng, *Mechanical Engineering Department, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061-0238, USA*; Robert W. Walters, *Department of Aerospace and Ocean Engineering, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061-0238, USA.*

An upwind line relaxation algorithm for the Navier–Stokes equations which employs inner iterations is applied to a supersonic and a subsonic test problem. The purpose of using inner iterations is to accelerate the convergence to steady-state solutions, thereby reducing the overall CPU time. A convergence criterion is developed to assist in automating the inner iterative procedure. The ability of the line inner iterative procedure to mimic the quadratic convergence of the direct solver method is confirmed in both test problems, but some of the non-quadratic inner iterative results were more efficient than the quadratic results. In the supersonic test case, the use of inner iterations was very efficient in reducing the residual to machine zero. For this test problem, the inner iteration method required only about 65% of the CPU time which was required by the most efficient line relaxation method without inner iterations. In the subsonic test case, poor matrix conditioning forced the use of under-relaxation in order to obtain convergence of the inner iterations, resulting in an overall method which was less efficient than line relaxation methods which employ a more conventional CPU savings strategy.

ORTHOGONAL MAPPING IN TWO DIMENSIONS. Ramani Duraiswami and Andrea Prosperetti, *Department of Mechanical Engineering, Johns Hopkins University, Baltimore, Maryland 21218, USA.*

A method for the generation of orthogonal boundary-fitted curvilinear coordinates for arbitrary simply- and doubly-connected domains is developed on the basis of the theory of quasi-conformal mappings of quadrilaterals and of previous work by Ryskin and Leal. The method has useful applications in orthogonal grid generation in two-dimensional and axi-symmetric domains and in the extension of rapid elliptic solvers and spectral methods to complex geometries. A new technique for the calculation of the conformal module of quadrilaterals is also presented.

AN EVALUATION OF THE SNIFFER GLOBAL OPTIMIZATION ALGORITHM USING STANDARD TEST FUNCTIONS. Roger A. R. Butler and Edward E. Slaminka, *Mathematics Department, Auburn University, Auburn, Alabama 36849-5319, USA.*

The performance of SNIFFER—a new global optimization algorithm—is compared with that of Simulated Annealing. Using the number of function evaluations as a measure of efficiency, the new algorithm is shown to be significantly better at finding the global minimum of seven standard test functions. Several of the test functions used have many local minima and very steep walls surrounding the global minimum. Such functions are intended to thwart global miminization algorithms.

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