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Abstracts of Papers to Appear in Future Issues

A Spectral Time Discretization for Flows with Dominant Periodicity. Gilles Carte and Jan Dušek, *Institut de Mécanique Statistique de la Turbulence, 12, Avenue du Général Leclerc, 13003 Marseille, France;* Philippe Fraunié, *LSEET, Université de Toulon et du Var, B. P. 132, 83957 La Garde, Cedex, France.*

An accurate and efficient treatment of periodic and quasi-periodic flows based on the temporal Fourier decomposition of the Navier–Stokes equations is suggested. A numerical implementation for a laminar afterbody wake in a 2D channel is presented. This implementation is formulated in primitive variables and uses an ordinary second-order accurate finite volume space discretization combined with a standard pressure correction procedure. A multistep time marching scheme for numerical and physical transients is developed. For flows with a variable dominant period, a period correction algorithm is used. The *transients characterizing the instability development are simulated. The* numerical results obtained for the afterbody wake confirm the expectations concerning the efficiency and high time accuracy of the method. Moreover, the method provides direct access to quantities difficult to obtain by other methods such as the envelope and the angular velocity variation of the unstable mode.

Accurate Solutions of the Navier–Stokes Equations Despite Unknown Outflow Boundary Data. Jan Nordström, *FFA, The Aeronautical Research Institute of Sweden, P.O. Box 11021, Bromma, S-116 11, Sweden.*

A very common procedure when constructing boundary conditions for the time-dependent Navier–Stokes equations at artificial boundaries is to extrapolate the solution from grid points near the boundary to the boundary itself. For supersonic outflow, where all the characteristic variables leave the computational domain, this leads to accurate results. In the case of subsonic outflow, where one characteristic variable enters the computational domain, one cannot in general expect accurate solutions by this procedure. The problem with outflow boundary operators of extrapolation type at artificial boundaries with errors in the boundary data of order one will be investigated. Both the problem when the artificial outflow boundary is located in essentially uniform flow and the situation when the artificial outflow boundary is located in a flow field with large gradients are discussed. It will be shown, that in the special case when there are large gradients tangential to the boundary, extrapolation methods can be used even in the subsonic case.

High-Order Taylor–Galerkin Methods for Linear Hyperbolic Systems. A. Safjan and J. T. Oden, *Texas Institute for Computational and Applied Mathematics, The University of Texas at Austin, MCC 3.11040, 3500 West Balcones Center Drive, Austin, Texas 78712, U.S.A.*

A new family of high-order Taylor–Galerkin schemes is presented for the analysis of first-order linear hyperbolic systems. The schemes are unconditionally stable which makes them very attractive to use in conjunction with adaptive *hp*-finite element methods for spatial approximation.

A Finite Difference Scheme for the $K(2, 2)$ Compacton Equation. J. de Frutos, M. A. López-Marcos, and J. M. Sanz-Serna, *Departamento de Matemática Aplicada y Computación, Universidad de Valladolid, Valladolid, Spain.*

The $K(2, 2)$ equation, introduced by Rosenau and Hyman, is a wave equation that possesses solutions (compactons) that vanish outside a bounded interval of the spatial axis. A finite difference scheme for this equation is suggested that can successfully cope with compacton interactions leading to negative waves. We show rigorously that in those interactions a loss of smoothness of the solution necessarily takes place.

High-Order Numerical Method for Two-Point Boundary Value Problems. Dianyun Peng, *Southwestern Institute of Physics, P.O. Box 432, 610041, Chengdu, People's Republic of China*

In this paper the two-point boundary value problem is transformed into general first-order ordinary differential equation system through introduction of conditions of an integral character to supplement the simultaneous set of first-order equations. A new discrete approximation of a high-order compact difference scheme is presented for the first-order system. It is a block-bidiagonal profile and removes the limits of other high-order discrete schemes at the interval ends. The numerical tests of a seventh-order compact difference scheme show that the proposed scheme is very convenient and efficient for linear and nonlinear two-point boundary value problems.

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