HOPF BIFURCATION OF THE UNSTEADY REGULARIZED DRIVEN CAVITY FLOW. Jie Shen, *Department of Mathematics and The Institute for Applied Mathematics and Scientific Computing, Indiana University, Bloomington, Indiana, USA.*

A numerical simulation of the unsteady incompressible flow in the unit cavity is performed by using a Chebyshev–Tau approximation for the space variables. The high accuracy of the spectral methods and the condensed distribution of the Chebyshev-collocation points near the boundary enable us to obtain reliable results for high Reynolds numbers with a moderate number of modes. It is found that the flow converges to a stationary state for Reynolds numbers (Re) up to 10,000; for Reynolds numbers larger than a critical value $10{,}000 < Re_1 < 10{,}500$ and less than another critical value $15{,}000 < Re_2 < 15{,}500$ the flow becomes periodic in time which indicates a Hopf bifurcation; the flow loses time periodicity for $Re \geqslant Re_2$.

CHEBYSHEV COLLOCATION SOLUTIONS OF THE NAVIER–STOKES EQUATIONS USING MULTI-DOMAIN DECOMPOSITION AND FINITE ELEMENT PRECONDITIONING. P. Demaret and M. O. Deville, *Université Catholique de Louvain, Unité de Mécanique Appliquée, Louvain-La-Neuve, BELGIUM.*

The steady Navier–Stokes equations are solved using series of basis functions involving Chebyshev polynomials. The projection method is a collocation scheme. A Newton's linearization is performed in order to obtain a set of algebraic equations. As the matrix system is ill conditioned, the collocation technique is preconditioned by a standard Galerkin finite element method using a nine nodes Lagrangian element which presents decisive advantages: sparsity, reduced condition number, easy treatment of complicated geometries. To handle non-trivial geometries in the collocation process, a domain decomposition is set up. The treatment of interface conditions is fully described. Several test problems like the regularized driven square cavity and the backward facing step are discussed to show the abilities of the present algorithm.

NOTES TO APPEAR

FAST AND ACCURATE SPECTRAL TREATMENT OF COORDINATE SINGULARITIES. S. Bouaoudia and P. S. Marcus, *University of California at Berkeley, Department of Mechanical Engineering, Berkeley, California, USA.*

ON A NUMERICAL METHOD FOR QUASI-CONFIRMAL GRID GENERATION. Prabir Daripa, *Division of Applied Mathematics, Department of Mathematics, Texas A&M University, College Station, Texas, USA.*

A SIMPLIFIED SHOOTING METHOD FOR THE DIATOMIC EIGENVALUE PROBLEM. Hafez Kobeissi, *Faculty of Science, Lebanese University, Beirut, LEBANON*; Ali El-Hajj, *Faculty of Engineering and Architecture, American University of Beirut, Beirut, LEBANON*; Munif Kobersi, *Group of Molecular and Atomic Physics at the National Research Council, Beirut, LEBANON.*

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