EUROMECH

EUROPEAN MECHANICS SOCIETY

Final Report
Date:

Please send this report to the Secretary-General of EUROMECH, Professor Bengt Lundberg, School of Engineering, Uppsala University, Box 534, S-751 21 Uppsala, Sweden, within one month after the Colloquium.

General

EUROMECH Colloquium No: 315 Dates: 7-9 March, 1994

Title: "Efficient Numerical Methods and Parallel Computing in Fluid Mechanics"

Co-Chairman: Prof. Christoph Zenger

Place and country: Institute of Fluid Mechanics, University of Erlangen-Nürnberg, Erlangen, Germany.

Is there need of another colloquium on the same subject? Which year? There is need of another colloquium on 1997.

Finance

Conference fee: 200,- DM

The fee included: a dinner and the book of abstracts.

Funding: from

Accomodation (type and cost):

Meals:

Participation

Number of participants from each country:

Austria		Germany	50	Rumania	
Belgium		Great Britain	5	Russia	3
Bielorussia		Greece		Slovakia	
Bosnia		Hungary		Slovenia	
Bulgaria	1	Ireland		Spain	1
Croatia		Italy	1	Sweden	1
Czech Republic		Latvia		Switzerland	
Denmark		Lithuania		Ukraine	
Estonia		Netherlands	1	Yugoslavia	
Finland	1	Norway		Others	
France	4	Poland			
Georgia		Portugal		Total	68

Please turn

EUROMECH Colloquium 315

"Efficient Numerical Methods and Parallel Computing in Fluid Mechanics

Institute of Fluid Mechanics,
University of Erlangen–Nürnberg
and
Bavarian Consortium for High
Performance Scientific Computing

The Euromech Colloquium 315 was held at the Institute of Fluid Mechanics of the University of Erlangen-Nürnberg, on March 7–9, 1994. This Colloquium was organized under the auspices of Prof. Dr. Dr. h.c. F. Durst (chairman) and the Bavarian Consortium for High Performance Scientific Computing. The aims of the Colloquium were to provide a forum for presentations and discussions of recent research in the areas of numerical methods and parallel computing as applied to fluid mechanics. Twenty-nine papers from nine European countries presented research in the topics of discretization methods for compressible and incompressible flows, acceleration techniques and adaptation procedures, parallel algorithms, domain decomposition techniques, load balancing procedures, as well as, scientific and industrial applications of high performance computational fluid dynamics (CFD). Furthermore, 68 scientists from several universities and research centres of Europe were involved in the discussions accompanying the presentation of the research papers.

Sixteen of the 29 papers presented in the Colloquium involved the development and applications in the field of parallel computing. The other 13 papers were focused on the investigation of structured and unstructured grid methods. In the field of parallel computing seven presentations were concerned with the parallelization and implementation of compressible flow algorithms on Multiple Instruction Multiple Data (MIMD) systems and Single Instruction Multiple Data (SIMD) parallel systems. Furthermore, six presentations were focused on the parallelization of flow algorithms for incompressible flows. The presentations showed that a significant reduction in the computing time can be achieved by using the present available computing resources. Although research in parallel algorithm developments has to be continued, the papers at the present Colloquium showed that parallel algorithms and techniques are at a mature stage to tackle complex physical and industrial fluid mechanics problems. According to the above, future research efforts have to be focused on the application of parallel computing to the study of complex problems.

In the field of numerical algorithms, structured and unstructured grid procedures with applications in incompressible and compressible flows were presented. Furthermore, investigation on multigrid techniques and adaptation procedures were shown. The presentations showed that by using multigrid techniques a significant reduction in the work units is obtained for incompressible flow calculations. For compressible flows the multigrid technique appeared to be less efficient especially for supersonic and hypersonic flows where the hyperbolic properties of the system of equations dominate. Furthermore, the papers concerning the unstructured grid techniques showed that such techniques can be very efficient in the capturing of shock waves. The extension of the above algorithms in 3D fluid mechanics problems appeared to be the intention of the participants in their future work.

Participants from different countries

Bulgaria: 1
Finland: 1
France: 4
Germany: 52
Italy: 1
The Netherlands: 1
Russia: 3
Sweden: 1
Spain: 1
United Kingdom: 5