HIGH PERFORMANCE COMPUTING IN FLUID DYNAMICS

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High Performance Computing in Fluid Dynamics

Proceedings of the Summerschool on High Performance Computing in Fluid Dynamics held at Delft University of Technology, The Netherlands, June 24–28 1996

Edited by

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Preface

This book contains the course notes of the Summerschool on High Performance Computing in Fluid Dynamics, held at the Delft University of Technology, June 24-28, 1996, under the auspices of and with support of ERCOFTAC (European Research Community on Flow, Turbulence and Combustion, WWW: http://imhefwww.epfl.ch/lmf/ERCOFTAC) and the J.M. Burgers Center (Graduate School for Fluid Dynamics, The Netherlands, WWW: http://tnj.phys.tue.nl/fdl/Burgers.html).

In addition to the material presented in the present volume, lectures were given by J. Häuser on "A parallel Newton-GMRES method for the 3D Navier-Stokes equations in complex geometries". The material written down by F.-S. Lien was presented by M.A. Leschziner.

This book is addressed to students on a graduate level and researchers in industry engaged in scientific computing, who have little or no experience with high performance computing, but who want to learn more, and/or want to port their code to parallel platforms. Applications in computational fluid dynamics are emphasized.

The lectures presented here deal to a large extent with algorithmic, programming and implementation issues, as well as experiences gained so far on parallel platforms. Attention is also given to mathematical aspects, notably domain decomposition and scalable algorithms. Computer science basics are not emphasized. Topics considered are: basic concepts of parallel computers, parallelization strategies, programming aspects, parallel algorithms, applications in computational fluid dynamics, the present hardware situation and developments to be expected. This reflects the order in which the material is presented. There are ample references to the current literature, so that the present work is a good starting point for those who want to enter the field of high performance computing, especially if applications in fluid dynamics are envisaged.

P.Wesseling Delft, March 1996

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