

NOTES ON NUMERICAL FLUID  
MECHANICS AND MULTIDISCIPLINARY  
DESIGN · VOLUME 93

# Advances in High Performance Computing and Computational Sciences

The 1st Kazakh-German  
Advanced Research Workshop,  
Almaty, Kazakhstan,  
September 25 – October 1, 2005

Yuri Shokin, Michael Resch,  
Nargozy Danaev, Murat Orunkhanov,  
Nina Shokina (Eds.)



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## Preface

This volume is published as the proceedings of the first Kazakh-German Advanced Research Workshop on Computational Science and High Performance Computing in Almaty, Kazakhstan, on September 25 - October 1, 2005.

The contributions of these proceedings were provided and edited by the authors, chosen after a careful selection and reviewing process.

The workshop was organized by the High Performance Computing Center Stuttgart (Stuttgart, Germany), al-Farabi Kazakh National University (Almaty, Kazakhstan) and the Institute of Computational Technologies SB RAS (Novosibirsk, Russia) in the framework of activities of the German-Russian Center for Computational Technologies and High Performance Computing.

In March 2005, further to the long-term collaboration between German and Siberian scientists, at Prof. Yuri Shokin's suggestion the Kazakh scientists from the al-Farabi Kazakh National University and Institute of Mathematics and Mechanics (al-Farabi Kazakh National University) have participated in the second Russian-German Advanced Research Workshop on Computational Science and High Performance Computing in Stuttgart, hereby establishing a multilateral cooperation. A keen interest has been shown in developing a close cooperation between German and Kazakh specialists in the field of computational science and high performance computing, giving the possibility of sharing and discussing the latest results and developing further scientific contacts.

The topics of the workshop include numerical modelling in problems on non-linear fiber optics and problems of electrical sounding, high performance computing, numerical modelling of flows in hydro turbines, computational fluid dynamics, visualization of computational modelling results, theory of mathematical methods, numerical modelling in problems on flame propagation, spray combustion and supersonic turbulent jets, smoothed particle hydrodynamics, numerical modelling in industrial problems, large-eddy simulations (LES) of complex flows.

The participation of representatives of major research organizations engaged in the solution of the most complex problems of mathematical mod-

elling, development of new algorithms, programs and key elements of information technologies, elaboration and implementation of software and hardware for high performance computing systems, provided a high level of competence of the workshop.

Among the Kazakh participants were researchers of the al-Farabi Kazakh National University (Almaty), the Institute of Mathematics and Mechanics (al-Farabi Kazakh National University, Almaty), the Institute of Mathematics (Almaty).

Among the German participants were the heads and leading specialists of the High Performance Computing Center Stuttgart (HLRS) (University of Stuttgart), the Institute of Aerodynamics and Gasdynamics (University of Stuttgart), the Institute of Aerodynamics (RWTH Aachen), the Institute of Applied Mathematics (University of Freiburg i. Br.), the Institute of Technical Thermodynamics (University of Karlsruhe(TH)).

Among the Russian participants were researchers of the Institute of Computational Technologies SB RAS (Novosibirsk) and the Sobolev Institute of Mathematics SB RAS (Novosibirsk).

This volume provides state-of-the-art scientific papers, presenting the latest results of the leading German, Kazakh and Russian institutions.

We are glad to see the successful continuation and promising perspectives of the highly professional international scientific meetings, which bring new insights and show the ways of future development in the problems of computational sciences and information technologies.

The editors would like to express their gratitude to all the participants of the workshop and wish them a further successful and fruitful work.

Novosibirsk and Stuttgart,  
November 2005

*Yurii Shokin*  
*Michael Resch*  
*Nargozy Danaev*  
*Murat Orunkhanov*  
*Nina Shokina*



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# Contents

<b>Solution of Maxwell's equations on partially unstructured meshes</b> <i>Yu.I. Shokin, A.S. Lebedev, O.V. Shtyrina, M.P. Fedoruk</i> . . . . .	1
<b>The integral equations method in problems of electrical sounding</b> <i>M. Orunkhanov, B. Mukanova</i> . . . . .	15
<b>The chain of abstraction in High Performance Computing and simulation</b> <i>M.M. Resch</i> . . . . .	23
<b>3D Euler flow simulation in hydro turbines: unsteady analysis and automatic design</b> <i>S. Cherny, D. Chirkov, V. Lapin, I. Lobareva, S. Sharov, V. Skorospelov</i> . . . . .	33
<b>On parallelization of one 3D fluid flow simulation code</b> <i>T. Bönisch, G.S. Khakimzyanov, N.Yu. Shokina</i> . . . . .	53
<b>Development of algorithm for visualization of results in scientific research</b> <i>G.Balakayeva, Y.Bogdanov</i> . . . . .	63
<b>A general object oriented framework for discretizing non-linear evolution equations</b> <i>A. Burri, A. Dedner, D. Diehl, R. Klöfkor, M. Ohlberger</i> . . . . .	69
<b>The Cauchy problem for Laplace equation on the plane</b> <i>S.I. Kabanikhin, G. Dairbaeva</i> . . . . .	89
<b>Challenges of future hardware development and consequences for numerical algorithms</b> <i>U. Küster</i> . . . . .	103

<b>Simulation of flame propagation in closed vessel with obstacles</b> <i>A. Kaltayev, Zh. Ualiev</i> .....	115
<b>Detailed numerical simulation of the auto-ignition of liquid fuel droplets</b> <i>R. Stauch, S. Lipp, U. Maas</i> .....	127
<b>Numerical investigation of a supersonic flow with jet injection</b> <i>A.Zh. Naimanova</i> .....	139
<b>Object-oriented framework for parallel smoothed particle hydrodynamics simulations</b> <i>S. Holtwick, S. Ganzenmüller, M. Hipp, S. Pinkenburg, W. Rosenstiel, H. Ruder</i> .....	151
<b>Numerical calculation of industrial problems</b> <i>U.K. Zhabbasbayev, G.I. Ramazanova, K.B. Rakhmetova</i> .....	169
<b>Large-eddy simulations for tundish and airfoil flows</b> <i>N. A. Alkishriwi, Q. Zhang, M. Meinke, W. Schröder</i> .....	185
<b>Solution of one mixed problem for equation of relaxational filtration by Monte Carlo methods</b> <i>K. Shakenov</i> .....	205
<b>Numerical prediction of vortex instabilities in turbomachinery</b> <i>A. Ruprecht</i> .....	211

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