

**NOTES ON NUMERICAL FLUID
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Numerical Flow Simulation II

CNRS-DFG Collaborative Research
Programmes Results
1998 – 2000

by Ernst Heinrich Hirschel (Ed.)



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Peter Thiede



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Numerical Flow Simulation II Ernst H. Hirschel, 2013-06-29 The aim of this series is to publish promptly and in a detailed form new material from the field of Numerical Fluid Mechanics including the use of advanced computer systems Published are reports on specialized conferences workshops research programs and monographs Contents This volume contains nineteen reports on work which is conducted since 1998 in the Collaborative Research Programme Numerical Flow Simulation of the Centre National de la Recherche Scientifique CNRS and the Deutsche Forschungsgemeinschaft DFG French and German engineers and mathematicians present their joint research on the topics Development of Solution Techniques Crystal Growth and Melts Flows of Reacting Gases and Turbulent Flows In the background of their work is the still strong growth of the performance of super computer architectures which together with large advances in algorithms is opening vast new application areas of numerical flow simulation in research and industrial work Results of this programme from the period 1996 to 1998 have been presented in NNFM 66 1998

New Results in Numerical and Experimental Fluid Mechanics V Hans Josef Rath, Carsten Holze, Hans-Joachim Heinemann, Rolf Henke, Heinz Hönlinger, 2007-12-10 This volume collects contributions to the 14th Symposium of the STAB German Aerospace Aerodynamics Association The association involves German scientists and engineers from universities research establishments and industry who are doing research and project work in numerical and experimental fluid mechanics and aerodynamics mainly for aerospace but for other applications too The volume gives a broad overview of ongoing work in Germany in this field

FLOMANIA - A European Initiative on Flow Physics Modelling Werner Haase, Bertrand Aupoix, Ulf Bunge, Dieter Schwamborn, 2006-10-02 This volume offers of the EU funded 5th Framework project FLOMANIA Flow Physics Modelling An Integrated Approach The book presents an introduction to the project exhibits partners methods and approaches and provides comprehensive reports of all applications treated in the project A complete chapter is devoted to a description of turbulence models used by the partners together with a section on lessons learned accompanied by a comprehensive list of references

Computational Science and High Performance Computing II Egon Krause, Yurii I. Shokin, Nina Shokina, 2006-06-18 This volume contains 27 contributions to the Second Russian German Advanced Research Workshop on Computational Science and High Performance Computing presented in March 2005 at Stuttgart Germany Contributions range from computer science mathematics and high performance computing to applications in mechanical and aerospace engineering

Numerical Simulation of Turbulent Flows and Noise Generation Christophe Brun, Daniel Juvé, Michael Manhart, Claus-Dieter Munz, 2009-03-07 Large Eddy Simulation LES is a high fidelity approach to the numerical simulation of turbulent flows Recent developments have shown LES to be able to predict aerodynamic noise generation and propagation as well as the turbulent flow by means of either a hybrid or a direct approach This book is based on the results of two French German research groups working on LES simulations in complex geometries and noise generation in turbulent flows The

results provide insights into modern prediction approaches for turbulent flows and noise generation mechanisms as well as their use for novel noise reduction concepts Advances in High Performance Computing and Computational Sciences Yuri I. Shokin, Nargozy Danaev, Murat Orunkhanov, Nina Shokina, 2006-09-25 This volume contains contributions to the First Kazakh German Advanced Research Workshop on Computational Science and High Performance Computing presented in September 2005 at Almaty Kazakhstan The contributions show the potential of bringing together theoretical mathematical modelling and powerful high performance computing systems **Progress in Computational Flow-Structure**

Interaction Werner Haase, Vittorio Selmin, Bengt Winzell, 2013-04-17 Aircraft design processes require extensive work in the area of both aerodynamics and structure forming an environment for aeroelasticity investigations Present and future designs of European aircraft are characterized by an ever increasing aircraft size and performance Strong weight saving requirements are met by introduction of new materials leading to more flexible structure of the aircraft Consequently aeroelastic phenomena such as vortex induced aeroelastic oscillations and moving shock waves can be predominant and may have a significant effect on the aircraft performance Hence the ability to estimate reliable margins for aeroelastic instabilities flutter or dynamic loads buffeting is a major concern to the aircraft designer As modern aircrafts have wing bending modes with frequencies that are low enough to influence the flight control system demands on unsteady aerodynamics and structural analysis to predict flight control effectiveness and riding comfort for passengers are extremely high Therefore the aircraft industries need an improved capacity of robust accurate and reliable prediction methods in the coupled aeroelastic flight mechanics and loads disciplines In particular it is necessary to develop improve and calibrate the numerical tools in order to predict with high level of accuracy and capability complex and non classical aeroelastic phenomena including aerodynamic non linearities such as shock waves and separation as well as structural non linearities e g control surface free play Nowadays robust methods for structural analysis and linearised unsteady aerodynamics are coupled and used by the aircraft industry to computationally clear a new design from flutter *MEGADESIGN and MegaOpt - German Initiatives for Aerodynamic Simulation and Optimization in Aircraft Design* Norbert Kroll, Dieter Schwamborn, Klaus Becker, Herbert Rieger, Frank Thiele, 2009-11-18 This volume contains results of the German CFD initiative MEGADESIGN which combines CFD development activities from DLR universities and aircraft industry Based on the DLR flow solvers FLOWer and TAU the main objectives of the four years project is to ensure the prediction accuracy with a guaranteed error bandwidth for certain aircraft configurations at design conditions to reduce the simulation turn around time for large scale applications significantly to improve the reliability of the flow solvers for full aircraft configurations in the complete flight regime to extend the flow solvers to allow for multidisciplinary simulations and to establish numerical shape optimization as a vital tool within the aircraft design process This volume highlights recent improvements and enhancements of the flow solvers as well as new developments with respect to aerodynamic and multidisciplinary shape optimization Improved numerical simulation

capabilities are demonstrated by several industrial applications

New Developments in Computational Fluid

Dynamics Kozo Fujii, Kazuhiro Nakahashi, Shigeru Obayashi, Satoko Komurasaki, 2006-01-05 Contains 20 papers presented at the Sixth International Nobeyama Workshop on the New Century of Computational Fluid Dynamics Nobeyama Japan April 21-24 2003 These papers cover computational electromagnetics astrophysical topics CFD research and applications in general large eddy simulation mesh generation topics visualization and more

New Results in Numerical and Experimental Fluid Mechanics III Siegfried Wagner, Ulrich Rist, Hans-Joachim Heinemann, Reinhard Hilbig, 2012-09-07 This volume contains the papers of a German symposium dealing with research and project work in numerical and experimental aerodynamics and fluid mechanics for aerospace and other applications It gives a broad overview over the ongoing work in this field in Germany

Hermann Schlichting - 100 Years Rolf Radespiel, Cord-Christian Rossow, Benjamin Winfried Brinkmann, 2009-03-06 Hermann Schlichting is one of the internationally leading scientists in the field of fluid mechanics during the 20 century He contributed largely to modern theories of viscous flows and aircraft aerodynamics His famous monographies Boundary Layer Theory and Aerodynamics of Aircraft are known worldwide and they appeared in six languages He held Chairs of Aerodynamics and Fluid Mechanics at Technische Universität Braunschweig during 37 years and directed the Institute of Aerodynamics of the Deutsche Forschungsgemeinschaft für Luftfahrt in Braunschweig He also directed the Aerodynamische Versuchsanstalt Göttingen and served in the Executive Board of the German Aerospace Center DLR Hermann Schlichting played a leading role in the rebuilding of aerospace research in Germany after the Second World War The occasion of his 100 birthday in the year 2007 was an excellent opportunity to acknowledge important ideas and accomplishments that Hermann Schlichting contributed to science The editors of this volume are the present successors of Hermann Schlichting in his role as director of the two research institutes in Braunschweig We were glad to host a scientific colloquium in his honor on 28 September 2007 Invited former scholars of Hermann Schlichting reviewed his work in boundary layer theory and in aircraft aerodynamics followed by presentations of important research results of his institutes today

Numerical Flow Simulation III Ernst Heinrich Hirschel, 2012-12-06 This volume contains eighteen reports on work which is conducted since 2000 in the Collaborative Research Programme Numerical Flow Simulation of the Centre National de la Recherche Scientifique CNRS and the Deutsche Forschungsgemeinschaft DFG French and German engineers and mathematicians present their joint research on the topics Development of Solution Techniques Crystal Growth and Melts Flows of Reacting Gases Sound Generation and Turbulent Flows In the background of their work is the still strong growth of the performance of super computer architectures which together with large advances in algorithms is opening vast new application areas of numerical flow simulation in research and industrial work Results of this programme from the period 1996 to 1998 have been presented in NNFM 66 1998 and NNFM 75 2001

Computational Fluid Dynamics for the 21st Century Mohamed Hafez, Koji Morinishi, Jacques Periaux, 2013-03-09 The goal of this book is to present the new trend of Computational Fluid

Dynamics CFD for the 21 st Century It consists of papers presented at a symposium honoring Prof No buyuki Satofuka on the occasion of his 60th birthday The symposium entitled Computational Fluid Dynamics fOT the 21st Century was held at Kyoto Institute of Technology KIT in Kyoto Japan on July 15 17 2000 The symposium was hosted by KIT as a memorial event celebrating the 100 year anniversary of this establishment The invited speakers were from Ja pan as weil as from the international community in Asia Europe and North America It is a great pleasure to dedicate this book to Prof Satofuka in appreciation ofhis contributions to this field During the last 30 years Prof Satofuka made many important contributions to CFD ad vancing the numerics and our understanding of flow physics in different regimes The details of his contributions are discussed in the first chapter The book contains chapters covering re lated topics with emphasis on new promising directions for the 21 st Century The chapters of the book reflect the 10 sessions of the symposium on both the numerics and the applications including grid generation and adaptation new numerical schemes optimi zation techniques and parallel computations as weil as applications to multi sc ale and multi physics problems design and flow control and new topics beyond aeronautics In the follow ing the chapters of the book are introduced

Aerodynamic Drag Reduction Technologies Peter Thiede,2013-06-29 This volume contains the Proceedings of the CEAS DragNet European Drag Reduction Conference held on 19 21 June 2000 in Potsdam Germany This conference succeeding the European Fora on Laminar Flow Technology 1992 and 1996 was initiated by the European Drag Reduction Network DragNet and organised by DGLR under the auspice of CEAS The conference addressed the recent advances in all areas of drag reduction research development validation and demonstration including laminar flow technology adaptive wing concepts turbulent and induced drag reduction separation control and supersonic flow aspects This volume which comprises more than 40 conference papers is of particular interest to engineers scientists and students working in the aeronautics industry research establishments or academia

MEGAFLOW - Numerical Flow Simulation for Aircraft Design Norbert Kroll,Jens K. Fassbender,2006-10-02 The aerospace industry increasingly relies on advanced numerical simulation tools in the early design phase This volume provides the results of a German initiative which combines many of the CFD development activities from the German Aerospace Center DLR universities and aircraft industry Numerical algorithms for structured and hybrid Navier Stokes solvers are presented in detail The capabilities of the software for complex industrial applications are demonstrated

Active Flow Control II Rudibert King,2010-04-06 The interest in the field of active flow control AFC is steadily increasing In cent years the number of conferences and special sessions devoted to AFC org ized by various institutions around the world continuously rises New advanced courses for AFC are offered by the American Institute of Aeronautics and Ast nautics AIAA the European Research Community on Flow Turbulence and Combustion ERCOFTAC the International Centre for Mechanical Sciences CISM the von Karman Institute for Fluid Dynamics VKI to name just a few New books on AFC are published by prominent colleagues of our field and even a new periodical the International Journal of Flow Control appeared Despite these

many activities in AFC it was felt that a follow up of the highly successful ACTIVE FLOW CONTROL Conference held in Berlin in 2006 was appropriate As in 2006 ACTIVE FLOW CONTROL II consisted only of invited lectures To sti late multidisciplinary discussions between experimental theoretical and numerical fluid dynamics aerodynamics turbomachinery mathematics control engineering metrology and computer science parallel sessions were excluded Unfortunately not all of the presented papers made it into this volume As the preparation and printing of a book takes time and as this volume should be available at the conf ence the Local Organizing Committee had to set up a very ambitious time sch ule which could not be met by all contributors

Noise and Vibration Mitigation for Rail Transportation Systems Burkhard Schulte-Werning, David Thompson, Pierre-Etienne Gautier, Carl Hanson, Brian Hemsworth, James Nelson, Tatsuo Maeda, Paul de Vos, 2008-04-10 This book contains the presentations given during the 9th International Workshop on Railway Noise IWRN9 which took place in Munich Feldafing Germany on 4th to 8th September 2007 This workshop was organised by the Acoustics and Vibration Department of DB Systemtechnik the technical engineering office of Deutsche Bahn AG More than 120 participants from 17 countries followed the invitation to the wo shop This great response showed the continuing interest in an important topic of railway technology and offered the opportunity to present the recent results of intense worldwide activities to the international community of railway noise and vibration experts and to share knowledge as well as experience Because an efficient transportation network is indispensable to handle the general mobility increase and road networks have reached their socio ecological limits the railway network is to be strengthened For example the European Commission has given distinct political signals to get more passengers onto the railways This policy represents a clear challenge for the next few decades not only for European railway companies the considerable increase in mobility will lead to a doubling of the railway traffic volume within the next 10 to 20 years To reduce the environmental impact the Directive on the Assessment and M agement of Environmental Noise has been put into force in Europe aiming at avo ing preventing or reducing harmful effects of environmental noise on human health

New Results in Numerical and Experimental Fluid Mechanics IV Christian Breitsamter, Boris Laschka, Hans-Joachim Heinemann, Reinhard Hilbig, 2012-08-13 This volume contains 59 papers presented at the 13th Symposium of STAB German Aerospace Aerodynamics Association In this association all those German scientists and engineers from universities research establishments and industry are involved who are doing research and project work in numerical and experimental fluid mechanics and aerodynamics mainly for aerospace but also in other applications Many of the contributions give results from federal and European Union sponsored projects The volume gives a broad overview of the ongoing work in this field in Germany Covered are flow problems of high and low aspect ratio wings and bluff bodies laminar flow control and transition hypersonic flows transition and fluid mechanical modelling LES and DNS numerical simulation aeroelasticity measuring techniques and propulsion flows

Computational Science and High Performance Computing III Egon Krause, Yurii I. Shokin, Nina Shokina, 2008-10-12 This volume contains 18 contributions to the Third

Russian German Advanced Research Workshop on Computational Science and High Performance Computing presented in July 2007 at Novosibirsk Russia The workshop was organized jointly by the High Performance Computing Center Stuttgart HLRS and the Institute of Computational Technologies of the Siberian Branch of the Russian Academy of Sciences ICT SB RAS The contributions range from computer science mathematics and high performance computing to applications in mechanical and aerospace engineering They show a wealth of theoretical work and simulation experience with a potential of bringing together theoretical mathematical modelling and usage of high performance computing systems presenting the state of the art of computational technologies

RESPACE - Key Technologies for Reusable Space Systems

Ali Gülhan, 2008-01-24 A few years ago the Helmholtz Association HGF consisting of 15 research Institutions including the German Aerospace Center DLR started a network research program called Virtual Institutes The basic idea of this program was to establish research groups formed by Helmholtz research centers and universities to study and develop methods or technologies for future applications and educate young scientists It should also enable and encourage the partners of this Virtual Institute after 3 years funding to continue their cooperation in other programs Following this HGF request and chance the DLR Windtunnel Department of the Institute of Aerodynamics and Flow Technology took the initiative and established a network with other DLR institutes and German universities RWTH Aachen University of Stuttgart and Technical University Munich The main goal of this network was to share the experience in system analysis aerodynamics and material science for aerospace for improving the understanding and applicability of some key technologies for future reusable space transportation systems Therefore the virtual institute was named RESPACE Key Technologies for Re Usable Space Systems

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