NOTES ON NUMERICAL FLUID MECHANICS AND MULTIDISCIPLINARY DESIGN · VOLUME 82

Numerical Flow Simulation III

CNRS-DFG Collaborative Research Programme
Results 2000–2002

Ernst Heinrich Hirschel (Ed.)

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Ernst Heinrich Hirschel,Egon Krause

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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 NNFM75 2001 *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 **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 **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 **ADIGMA – A European Initiative on the Development of Adaptive Higher-Order Variational Methods for Aerospace Applications** Norbert Kroll,Heribert Bieler,Herman Deconinck,Vincent Couaillier,Harmen van der Ven,Kaare Sorensen,2010-09-18 This volume contains results gained from the EU funded 6th Framework project ADIGMA Adaptive Higher order Variational Methods for Aerodynamic Applications in Industry The goal of ADIGMA was the development and utilization of innovative adaptive higher order methods for the compressible flow equations enabling reliable mesh independent numerical solutions for large scale aerodynamic applications in aircraft industry The ADIGMA consortium was comprised of 22 organizations which included the main European aircraft manufacturers the major European research establishments and several universities all with well proven expertise in Computational Fluid Dynamics CFD The book presents an introduction to the project exhibits partners methods and approaches and provides a critical assessment of the newly developed methods for industrial aerodynamic applications The best numerical strategies for integration as major building blocks for the next generation of industrial flow solvers are identified **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 *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 Unsteady Effects of Shock Wave induced Separation Piotr Doerffer,Charles Hirsch,Jean-Paul Dussauge,Holger Babinsky,George N. Barakos,2010-11-25 This volume contains description of experimental and numerical results obtained in the UFAST project The goal of the project was to generate experiment data bank providing unsteady characteristics of the shock boundary layer interaction The experiments concerned basic reference cases and the cases with application of flow control devices Obtained new data bank have been used for the comparison with available simulation techniques starting from RANS through URANS LES and hybrid RANS LES methods New understanding of flow physics as well as ability of different numerical methods in the prediction of such unsteady flow phenomena will be discussed **Progress in Hybrid RANS-LES Modelling** Shia-Hui Peng,Piotr Doerffer,Werner Haase,2010-09-17 Hybrid modelling of turbulent flows combining RANS and LES techniques has

received increasing attention over the past decade to fill the gap between U RANS and LES computations in aerodynamic applications at industrially relevant Reynolds numbers With the advantage of hybrid RANS LES modelling approaches being considerably more computationally efficient than full LES and more accurate than U RANS particularly for unsteady aerodynamic flows has motivated numerous research and development activities These activities have been increasingly stimulated by the provision of modern computing facilities The present book contains the contributions presented at the Third Symposium on Hybrid RANS LES Methods held in Gdansk Poland 10 12 June 2009 To a certain extent this conference was a continuation of the first symposium taking place in Stockholm Sweden 2005 and the second in Corfu Greece 2007 Motivated by the extensive interest in the research community the papers presented at the Corfu symposium were published by Springer in the book entitled Advances in Hybrid RANS LES Modelling in Notes on Numerical Fluid Mechanics and Multidisciplinary Design Vol 97 At the Gdansk symposium along with four invited keynotes given respectively by S Fu U Michel M Sillen and P Spalart another 28 papers were presented on the following topics Unsteady RANS LES Improved DES Methods Hybrid RANS LES Methods DES versus URANS and other Hybrid Methods Modelli related Numerical Issues and Industrial Applications After the symposium all full papers have been further reviewed and revised for publication in the present book Turbulence and Interactions Michel Deville,Thien-Hiep Lê,Pierre Sagaut,2010-09-28 This volume contains six keynote lectures and 44 contributed papers of the TI 2009 conference that was held in Saint Luce La Martinique May 31 June 5 2009 These lectures address the latest developments in direct numerical simulations large eddy simulations compressible turbulence coherent structures droplets two phase flows etc The present monograph is a snapshot of the state of the art in the field of turbulence with a broad view on theory experiments and numerical simulations 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 *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 *100 Volumes of 'Notes on Numerical Fluid Mechanics'* Ernst Heinrich Hirschel,Egon Krause,2009-05-19 In a book that will be required reading for engineers physicists and computer scientists the editors have collated a number of articles on fluid mechanics written by some of the world s leading researchers and practitioners in this important subject area *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 Advances in High Performance Computing and Computational Sciences Yurii 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 **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 th 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 U versit t Braunschweig during 37 years and directed the Institute of Aerodynamics of the Deutsche Forschungsanstalt f r Luftfahrt in Braunschweig He also directed the Aerodynamische Versuchsanstalt G ttingen and served in the Executive Board of the German Aerospace Center DFVLR Hermann Schlichting played a leading role in the rebuilding of aerospace research in Germany after the Second World War th The occasion of his 100 birthday in the year 2007 was an excellent opportunity to acknowledge important ideas and accomplishments that Hermann Schlichting c tributed 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 New Results in Numerical and Experimental Fluid Mechanics VI Cameron Tropea,2007-10-26 This volume features the contributions to the 15th Symposium of the STAB German Aerospace Aerodynamics Association Papers provide a broad overview of ongoing work in Germany including high aspect ratio wings low aspect ratio wings bluff bodies laminar flow control and transition active flow control hypersonic flows aeroelasticity aeroacoustics mathematical fundamentals numerical simulations physical

fundamentals and facilities **New Results in Numerical and Experimental Fluid Mechanics VII** Andreas Dillmann,Gerd Heller,Wolfgang Schröder,Wolfgang Nitsche,Michael Klaas,Hans-Peter Kreplin,2010-10-05 th This volume contains the papers presented at the 16 DGLR STAB Symposium held at the Eurogress Aachen and organized by RWTH Aachen University Germany November 3 4 2008 STAB is the German Aerospace Aerodynamics Association founded towards the end of the 1970 s whereas DGLR is the German Society for Aeronautics and Astronautics Deutsche Gesellschaft f r Luft und Raumfahrt Lilienthal Oberth e V The mission of STAB is to foster development and acceptance of the discipline Aerodynamics in Germany One of its general guidelines is to concentrate resources and know how in the involved institutions and to avoid duplication in research work as much as possible Nowadays this is more necessary than ever The experience made in the past makes it easier now to obtain new knowledge for solving today s and tomorrow s problems STAB unites German scientists and engineers from universities research establishments and industry doing research and project work in numerical and experimental fluid mechanics and aerodynamics for aerospace and other applications This has always been the basis of numerous common research activities sponsored by different funding agencies Since 1986 the symposium has taken place at different locations in Germany every two years In between STAB workshops regularly take place at the DLR in G ttingen *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 u versities RWTH Aachen University of Stuttgart and Technical University Munich The main goal of this network was to share the experience in system analysis ae dynamics and material science for aerospace for improving the understanding and applicability of some key technologies for future reusable space transportation s tems Therefore the virtual institute was named RESPACE Key Technologies for Re Usable Space Systems **Advances in Hybrid RANS-LES Modelling** Shia-Hui Peng,Werner Haase,2008-01-24 Turbulence modelling has long been and will remain one of the most important t ics in turbulence research challenging scientists and engineers in the academic world and in the industrial society Over the past decade Detached Eddy Simulation DES and other hybrid RANS LES methods have received increasing attention from the turbulence research community as well as from industrial CFD engineers Indeed as an engineering modelling approach hybrid RANS LES methods have acquired a remarkable profile in modelling turbulent flows of industrial interest in relation to for example transportation energy production and the environment The advantage exploited with hybrid RANS LES

modelling approaches being tentially more computationally efficient than LES and more accurate than unsteady RANS has motivated numerous research and development activities These activities together with industrial applications have been further facilitated over the recent years by the rapid development of modern computing resources As a European initiative the EU project DESider Detached Eddy Simulation for Industrial Aerodynamics 2004 2007 has been one of the earliest and most systematic international R D effort with its focus on development improvement and applications of a variety of existing and new hybrid RANS LES modelling approaches as well as on related numerical issues In association with the DESider project two subsequent international symposia on hybrid RANS LES methods have been arranged in Stockholm Sweden 2005 and in Corfu Greece 2007 respectively The present book is a result of the Second Symposium on Hybrid RANS LES Methods held in Corfu Greece 17 18 June 2007

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