Preface

Motivated by the immediate computational needs of industry, *accuracy-on-demand* turbulence simulation approaches that judiciously combine the advantages of Reynolds-Averaged Navier-Stokes (RANS) and Large Eddy Simulation (LES), broadly classified as hybrid RANS-LES methods, have witnessed rapid development over the last decade. Despite the best efforts of turbulence researchers worldwide, many challenges still remain, especially those pertaining to robustness and applicability to complex engineering flows. It is recognized that further improvement and development are required before hybrid RANS-LES methods can become frontline Computational Fluid Dynamics (CFD) tools for practical applications. The *Symposium on Hybrid RANS-LES Methods* (HRLM) is an important international forum that places specific emphasis on hybrid methods. The main aim of the series of symposia has been to bring together researchers from universities and research institutes, as well as industrial engineers, R&D managers and consultants, to report and discuss the latest developments and applications of advanced turbulence-resolving modelling and simulation methods. The previous HRLM symposia have played an important and unique role in communicating current activities and progress in the field.

This book contains the contributions presented at the 5th Symposium on Hybrid RANS-LES Methods (HRLM-5), which took place in College Station, Texas, USA, 18–21, March 2014. The previous HRLM symposia took place in Stockholm (Sweden, 2005), Corfu (Greece, 2007), Gdansk (Poland, 2009) and Beijing (China, 2011). It is hoped that the book will serve as a useful source of information and inspiration for further advancement of engineering turbulence closure modelling.

The HRLM-5 Symposium included four invited lectures—by K. Hanjalic (Delft University of Technology), P. Spalart (Boeing), V. Yakhot (Boston University) and B. Basara (AVL)—and 43 contributed papers addressing the following topics: *Novel turbulence-resolving simulation and modelling methods, Improved hybrid RANS-LES methods (including DES-type and Embedded LES approaches), Comparative studies of difference modelling methods, Modelling-related numerical issues and Industrial applications.* All the papers included in the present book, 40 in total, have been peer-reviewed.

The HRLM-5 Symposium was co-organized by Texas A&M University and the EU Go4Hybrid Project Consortium. The symposium owes its success to the support of the participants and further, for the publication of the book, to the invited and contributing authors. The Scientific Committee members and a number of external experts served to review the full papers, which has greatly helped in further improving the quality of the book. We are grateful to the following experts for reviewing the full manuscripts appearing in the present HRLM-5 Symposium book: B. Aupoix, B. Basara, R.A. Bauerle, M. Braza, L. Davidson, S. Deck, S. Fu, M.K. Frendi, T. Gatski, M. Germano, K. Hanjalic, S. Jakirlic, J. Kok, D. Laurence, F. Menter, C. Mockett, C. Rumsey, P. Spalart, M. Strelets, F. Thiele, S. Wallin, and V. Yakhot.

Last, but not the least, the editors are grateful for the excellent and dedicated work by the local organizing team consisting of Texas A&M University students. Their effort contributed greatly to making this 5th Symposium a success. Moreover, we wish to express our sincere gratitude to our corporate sponsors: AIRBUS, ANSYS, AVL, CFD Software GmbH and Rolls-Royce Ltd.

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Sharath Girimaji
Werner Haase
Shia-Hui Peng
Dieter Schwamborn

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