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Editors

Martin Oberlack · Joachim Peinke ·
Alessandro Talamelli · Luciano Castillo ·
Michael Hölling

Progress in Turbulence and Wind Energy IV

Proceedings of the iTi Conference in Turbulence 2010

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Editors
Prof. Dr. Martin Oberlack
Department of Mechanical
Engineering
Technische Universität Darmstadt
Darmstadt
Germany

Prof. Dr. Luciano Castillo
Mechanical, Aerospace & Nuclear
Engineering Department
Rensselaer Polytechnic Institute
Troy
USA

Prof. Dr. Joachim Peinke
Institute of Physics & ForWind
University Oldenburg
Oldenburg
Germany

Dr. Michael Hölling
Institute of Physics & ForWind
University of Oldenburg
Oldenburg
Germany

Prof. Dr. Alessandro Talamelli
II Facoltà di Ingegneria
Universita di Bologna
Forli
Italy

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“Allora è l’huomo in pace, quando per morte è uscito delle turbolenze di questo mondo, e venuto alla salute eterna.”

Prima definizione di “Turbolenza” - Vocabolario Accademia della Crusca, Venezia (1612)

“And man shall be at peace when death removes him from the turbulence of this world and he comes to know eternal wellbeing”

First definition of the word “turbolenza” from the Accademia della Crusca Dictionary, Venice, Italy (1612)

To our colleague and friend Tim (1966–2010)

Preface 2011

With the 4th ITI conference in the beautiful ancient town of Bertinoro, North Italy, 2010, the tradition of the interdisciplinary turbulence initiative (ITI) has been continued. About 100 researchers from about 20 different countries gathered in the hospitable centre of the University of Bologna to present the latest contributions in turbulence research. After an external peer review process the present 63 papers were collected for this forth issue on "progress in turbulence" dedicated to the memory of Prof. Tim Nickels. Shortly after giving an invited lecture at the 4th ITI conference, the turbulence community lost a world-class scientist, a friend and devoted family man.

Basic as well as applied research is driven by the rather notorious difficult and essentially unsolved problem of turbulence. In this collection of contributions clear progress can be seen in different aspects, ranging from new quality of numerical simulations to new concepts of experimental investigations and new theoretical developments. The importance of turbulence is shown for a wide range of applications including: combustion, energy, flow control, urban flows, are few examples found in this volume. A motivation this year was to bring fundamentals of turbulence in connection with renewable energy. This lead us to add a special topic relevant to the impact of turbulence on the wind energy conversion.

Beside all progress we have to realize that a general fundamental understanding of turbulence is still missing, even though new approaches are discovered and investigated. These new approaches often lead to new methods, which result in being very useful for other disciplines. Thus turbulence research has been a source of new scientific fields over the last decades. Nonlinear dynamics, chaos research, fractals and complexity may be taken as examples.

This span of research from pure mathematical analysis over turbulence physics to applied turbulence research has lead in the last decades to a broad diversification of turbulence research where contact between different sub-communities has sometimes been lost. It was in particular the latter drifting apart in the community that has

been the stimulation of the interdisciplinary turbulence initiative, which started in 1999 as cooperation between physicists and engineers working in turbulence funded by the German science foundation DFG. Based on the successful previous conferences, we will continue with this initiative for subsequent years with the 5th ITI Conference planned for September 2012.

The structure of the present book is as such that contributions have been bundled according to covering topics i.e. I Basic Turbulence Aspects, II Particle Laden Flows, III Modeling and Simulations, IV, Experimental Methods, V Special Flows, VI Atmospheric Boundary Layer, VII Boundary Layer, VIII Wind Energy and IX Convection.

At this point we would like to thank all authors for their contributions to this proceedings and the referees giving critical comments to the contributions and there with considerably raising the scientific quality. We would like to thank Thomas Ditzinger from Springer for his patience during the production of the book. Finally we gratefully acknowledge the staff of the University of Bologna and Olga Kelbin, George Khujadze, Andreas Rosteck for helping us to carry out this conference.

Martin Oberlack
Joachim Peinke
Alessandro Talamelli
Luciano Castillo
Michael Hölling
(Darmstadt, Oldenburg, Forli and Texas, 2012)

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