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## 5th International Symposium on Bifurcations and Instabilities in Fluid Dynamics (BIFD2013) Foreword

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## **Foreword**

### **Fifth International Symposium on Bifurcations and Instabilities in Fluid Dynamics (BIFD2013)**

Hydrodynamic stability is of fundamental importance in fluid dynamics and is a well-established subject of scientific investigation that continues to attract great interest in the fluid mechanics community. Bifurcations and instabilities are observed in all areas of fundamental and applied fluid dynamics and remain a challenge for experimental, theoretical, and computational studies. Hydrodynamic instabilities of prototypical character are, for example, Rayleigh Bénard, Taylor Couette, Bénard Marangoni, Rayleigh Taylor, and Kelvin Helmholtz instabilities. A fundamental understanding of various patterns of bifurcations (such as identifying the most dominant mechanisms responsible for the instability threshold) is also required if one is to design reliable and efficient industrial processes and applications, such as melting, mixing, crystal growth, coating, welding, and flow re-attachment over wings. The modeling of various instability mechanisms in biological and biomedical devices is currently a very active and rapidly developing area of research and has important biotechnological and medical applications (biofilm engineering, wound healing, etc). The understanding of symmetry breaking in hemodynamics could have important consequences for vascular diseases (such as atherosclerotic and vulnerable plaques, abdominal aortic aneurysm, carotid artery disease, and pulmonary embolism) and implications for vascular interventions (for example, grafting and stenting).

The collection of papers in this issue is a selection of the presentations given at the Fifth International Symposium on Instability and Bifurcations in Fluid Dynamics (BIFD) held at the Faculty of Mechanical Engineering, Technion Israel Institute of Technology, Haifa, Israel, 8-11 July 2013. With three invited and 140 contributed talks, the symposium gave an overview of state-of-the-art developments in the field, including experimental, theoretical, and computational approaches to problems related to convection, the effects of magnetic fields, wake flows, rotating flows, and many others. The complete program can be found at the conference website (<http://bifd2013.technion.ac.il/>).

The series of BIFD symposia started as a small workshop in Madeira, Portugal, in 2004 with just 22 participants. This number increased rapidly during the second, third and fourth symposia held in 2006 (Copenhagen, Denmark), 2009 (Nottingham, United Kingdom) and 2011 (Barcelona, Spain) with 40, 110 and nearly 200 participants, respectively. More than 150 participants from around the world took part in the fifth symposium in Haifa, Israel. The next symposium in the series will take place in Paris, France, in July 2015.

The Organizing Committee of the Fifth BIFD thanks the Editors of Fluid Dynamics Research for offering us the opportunity to publish a peer-reviewed special issue of the journal related to this conference. Special thanks are given to the Editors, M Asai, A D Gilbert, E Knobloch, M Maxey, H J Sung and W R Young for closely working with us on this issue. We thank both the authors and the referees for working with us on the rather tight schedule necessary to release the issue as soon as possible following the conference.

The financial and logistical support from the Technion Israel Institute of Technology, the Faculty of Mechanical Engineering of the Technion Israel Institute of Technology and the Tel Aviv University is greatly appreciated.

Finally, slightly before this volume went to press, one of its contributing authors, Dr. Sergey ShklyaeV, suddenly and untimely passed away at the very young age of 40 in the midst of his professional activity. His numerous and multifaceted scientific achievements will inspire researchers for years to come.

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