

Preface

The present volume is a collection of papers devoted to current research topics in mathematical analysis, probability and applications, including the topics in mathematical physics and numerical analysis. It originates from plenary lectures given at the 10th International ISAAC Congress, held during 3–8 August 2015 at the University of Macau, China.

The papers, authored by eminent specialists, aim at presenting to a large audience some of the attractive and challenging themes of modern analysis:

- Partial differential equations of mathematical physics, including study of the equations of incompressible viscous flows, and of the Tricomi, Klein–Gordon and Einstein–de Sitter equations. Governing equations of fluid membranes are also considered in this volume.
- Fourier analysis and applications, in particular construction of Fourier and Mellin-type transform pairs for given planar domains, multiplication and composition operators for modulation spaces, harmonic analysis of first-order systems on Lipschitz domains.
- Reviews of results on probability, concerning in particular the bi-free extension of the free probability and a survey of Brownian motion based on the Langevin equation with white noise.
- Numerical analysis, in particular sparse approximation by greedy algorithms, and theory of reproducing kernels, with applications to analysis and numerical analysis.

The volume also includes a contribution on visual exploration of complex functions: the technique of domain colouring allows to represent complex functions as images, and it draws surprisingly mathematics near the modern arts.

Besides plenary talks, about 300 scientific communications were delivered during the Macau ISAAC Congress. Their texts are published in an independent volume. On the whole, the congress demonstrated, in particular, the increasing and major role of Asian countries in several research areas of mathematical analysis.

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