

## Preface

At the Eighth Congress of the International Society for Analysis, its Applications and Computations (ISAAC) held at the Peoples' Friendship University of Russia in Moscow on August 22–27, 2011, a new initiative on selecting contributions from two special sessions, one on Pseudo-Differential Operators and the other on Generalized Functions and Asymptotics, for one volume was taken to heart by many participants. This resonates well with the grandeur of ISAAC of considering Analysis, Applications and Computations on an international scale as a unified discipline. This can be achieved, notwithstanding the diversity of the disciplines, by building synergies among clusters consisting of several closely related disciplines. To that end, volumes on pseudo-differential operators and applications in mathematical sciences have been published since the ISAAC Congress held at York University in 2003. The present volume entitled “Pseudo-Differential Operators, Generalized Functions and Asymptotics” is another project with this vision in mind.

This volume contains three categories of papers, originated from the Eighth ISAAC Congress or solicited by invitations, corresponding to each of the three areas in the title. The category of papers on pseudo-differential operators contains such topics as elliptic operators associated to diffeomorphisms of smooth manifolds, analysis on singular manifolds with edges, heat kernels and Green functions of sub-Laplacians on the Heisenberg group and Lie groups with more complexities than but closely related to the Heisenberg group,  $L^p$ -boundedness of pseudo-differential operators on the torus, pseudo-differential operators and Gelfand–Shilov spaces, and pseudo-differential operators in the context of time-frequency analysis.

The second group of papers is on generalized functions. Various classes of distributions and algebras of generalized functions are used for various linear partial differential equations and some of these have nonregular coefficients. Moreover, nonlinear problems with nonregular initial values or boundary conditions are treated in this framework. Featured in this volume are also papers on stochastic and Malliavin-type differential equations in which generalized functions are instrumental. This second group of papers are related to the third collection of papers via the setting of Colombeau-type spaces and algebras in which microlocal analysis is developed by means of various techniques of asymptotics.

This volume contains interesting topics in pseudo-differential operators, generalized functions and asymptotics that are essential in modern mathematical sciences and engineering. It is a volume that put different but related areas of analysis

on an equal footing. It is through working with colleagues with a diversity of related expertise and through regular meetings and publishing that we can deepen our understanding of a vast area of mathematics that has been known as analysis.

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and Asymptotics

Molahajloo, S.; Pilipović, S.; Toft, J.; Wong, M.W. (Eds.)

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